Fish & Wildlife Division

RESOURCE DATA AND SPECIES AT RISK SECTION

# MULTISAR:

## A Multi-Species Conservation Strategy For Species at Risk

## Year 3 Report

Alberta Species at Risk Report No. 98

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Alberta Conservation Association
Conservation Through Collaboration

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT
Public Lands & Forests

# MULTISAR:

## A Multi-Species Conservation Strategy For Species at Risk

## Year 3 Report

**Brandy L. Downey, Brad A. Downey, Richard W. Quinlan and Paul F. Jones (eds.)**

**Alberta Species at Risk Report No. 98**

**March 2005**

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT
Fish & Wildlife

Alberta Conservation Association
Conservation Through Collaboration

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT
Public Lands & Forests

Publication No. I/214
ISBN: 0-7785-4057-X (Printed Edition)
ISBN: 0-7785-4058-8 (On-line Edition)
ISSN: 1496-7219 (Printed Edition)
ISSN: 1496-7146 (On-line Edition)

Illustrations by: Brian Huffman

For copies of this report, contact:

Information Centre- Publications
Alberta Environment/ Alberta Sustainable Resource Development
Main Floor, Great West Life Building
9920-108 Street
Edmonton, Alberta, Canada T5K 2M4
Telephone: (780) 422-2079

OR

Visit our web site at:
http://ww3.gov.ab.ca/srd/fw/riskspecies/

OR

Visit the MULTISAR website at:
http://www.multisar-milkriverbasin.com

Suggested citation formats:

Entire report

Downey, B. L., B. A. Downey, R.W. Quinlan and P. F. Jones (eds.). 2005. MULTISAR: A Multi-Species Conservation Strategy For Species at Risk Year 3 Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No.98, Edmonton, AB. 56 pp.

Chapter of report

Downey, B.L. 2005. Burrowing Owl Surveys in the Milk River Basin: 2004, Pages 13-16 *In* Downey, B.L., B. A. Downey, R.W. Quinlan and P. F. Jones (eds.). 2005. MULTISAR: A Multi-Species Conservation Strategy For Species at Risk Year 3 Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 98, Edmonton, AB.

## Table of Contents

List of Tables ..... iiii
List of Figures ..... iii
List of Appendices ..... iii
Acknowledgements ..... iv
Executive Summary ..... v

**CHAPTER 1-INTRODUCTION**

Introduction ..... 2
Brandy L. Downey and Richard W. Quinlan

Study Area: The Milk River Basin ..... 4
Brad N. Taylor and Brad A. Downey

**CHAPTER 2- WILDLIFE INVENTORIES**

Aerial Raptor Survey: 2004 ..... 8
Brad A. Downey and Richard W. Quinlan

Burrowing Owl Surveys in the Milk River Basin: 2004 ..... 13
Brandy L. Downey

Ferruginous Hawk and Richardson's Ground Squirrel Surveys in the Milk River Basin 17
Brad A. Downey and Brandy L. Downey

Grassland Bird Monitoring Surveys ..... 23
Brandy L. Downey

Identification of Small Mammals Through the Analysis of Owl Pellets ..... 28
Roy Schmelzeisen and Amanda Rezansoff

Loggerhead Shrike Surveys: 2004 ..... 34
Brad A. Downey

Long-tailed Weasel Survey ..... 39
Brandy L. Downey

Results of Fish Refugia Surveys Completed in 2004 ..... 43
Terry B. Clayton and Brad A. Downey

**CHAPTER 3- STEWARDSHIP**

MULTISAR Stewardship Program ..... 50
Bradny L. Downey, Richard W. Quinlan, Brad A. Downey and Paul F. Jones

## List of Tables

Table 2.1: Number of raptors observed on the Milk River 2004 aerial raptor survey between Deer Creek Bridge and Milk River Airport. ..... 9
Table 2.2: The numbers of raptors observed from the Deer Creek Bridge to the Milk River Airport over the four-year aerial surveys. ..... 9
Table 2.3: The number of raptor nests observed from the Deer Creek Bridge to the Milk River Airport over fours years of aerial surveys. ..... 9
Table 2.4: Milk River Basin grassland bird survey results from 2001-2004 ..... 24
Table 2.5: Specimen counts from owl pellets. ..... 29
Table 2.6: General site information for owl pellet collections ..... 30
Table 2.7: Loggerhead shrike main habitat characteristics based on 69 individual sites from 2002 - 2004. ..... 36
Table 2.8: Average of all measurements taken for each tributary measured in the Milk River Basin in 2004. ..... 44
Table 2.9: Species of fish caught in each tributary in 2004. ..... 44
Table 3.1: MULTISAR presentations and brochure distribution. ..... 53

## List of Figures

Figure 1.1: Milk River Basin Study Area ..... 4
Figure 2.1: Loggerhead shrike occupied sites within and adjacent to the Milk River Basin, 2002-2004. ..... 35

## List of Appendices

Appendix A- Aerial Survey Observations ..... 11
Appendix B- Chi-Square analysis and Bonferoni 95% Confidence Intervals for various Grassland Bird Species ..... 27
Appendix C- Milk River Basin Owl Pellet Identification Data Sheet ..... 32
Appendix D- Fish Refugia Site Photographs ..... 47

105-05069/

## Acknowledgements

Funding for MULTISAR was provided through The Government of Canada Habitat Stewardship Program for Species at Risk, the North American Waterfowl Management Plan, the Alberta Fish and Wildlife Species at Risk Program, and the Alberta Conservation Association.

Richard Quinlan (Alberta Fish and Wildlife Division - AFWD) and Paul Jones (Alberta Conservation Association - ACA) developed, coordinated, supervised and administered MULTISAR. Throughout the project Brad Downey (ACA) and Brandy Downey (AFWD) provided valuable contributions, particularly with respect to field logistics. Barry Adams and Jen Carlson of Alberta Public Lands and Forests Division (APLD) and Joel Nicholson (AFWD) have recently joined the MULTISAR team and are key in the development and delivery of the MULTISAR Stewardship Program.

Thank you to the numerous individuals and organizations who were involved with wildlife inventories: Leo Dube (AFWD), Kim Morton (AFWD), Joel Nicholson (AFWD), Terry Clayton (AFWD), Glen Clements (AFWD), Julie Landry-DeBoer (ACA), Linda Cerney (ACA), and Cori Lausen (University of Calgary). Thank you to Roy Schmelzeisen and Amanda Rezansoff of the ACA for conducting the owl pellet analysis.

Terry Hood (APLD) aided in the development of the first MULTISAR Habitat Conservation Strategy. Thank you to Clare, Kathy and Steven Tannas of Eastern Slopes Rangeland Seeds for completing the habitat assessments. Thank you to Cows and Fish for providing historical information and aerial photos on the participating ranch. We are especially grateful to our first cooperative landowners who have not only provided the land to apply the first stewardship program but have also become an equal partner in the development of their own habitat conservation strategies.

Steve Brechtel (AFWD), William McDonald and Thomas Booth (SRD Environmental Law Section lawyers) have assisted the MULTISAR team in preliminary work towards drafting of a MULTISAR Conservation Agreement format.

## Executive Summary

MULTISAR outlines a process to provide appropriate management on critical parts of the landscape to achieve multi-species conservation. In the first year of study a summary of existing information on species at risk, identification of data gaps, fish and wildlife inventories from within the project area, and a species selection process were completed (Quinlan et al. 2003) The year two report included the results of wildlife inventories, an explanation of the Multi-species Conservation Value (MCV) and an outline of stewardship initiatives for initiation in year 3 (Quinlan et al. 2004). Two additional reports describe habitat modeling (Downey et al. 2004) and beneficial management practices (BMPs) developed for the project (Rangeland Conservation Service ltd. 2004) This year (year 3) the project has progressed beyond the development of tools for multi-species conservation to emphasize implementation of stewardship programs in areas of high conservation priority. This report includes the results of species inventories, highlights of the stewardship program, and a guide to the future direction of MULTISAR.

The project began as a concept within Alberta's Habitat Stewardship Program committee, and was subsequently designed by Alberta Fish and Wildlife and Alberta Conservation Association biologists. It has been delivered through a concerted effort involving permanent and project staff of Alberta Conservation Association, Alberta Fish and Wildlife Division, and Alberta Public Lands and Forests Division plus private biologists in the disciplines of wildlife, fishery, and range science.

The development of the MCV and BMPs paved the path for the next step in this process. Stewardship programs have been initiated on 61,280 acres selected through application of the MCV. Additional landowners whose land qualifies through high MCV and other criteria will be approached for initiation of stewardship programs in 2005 and 2006. Wildlife surveys will still be continued throughout the basin however attention will be focused on the areas identified as species at risk "Hot Spots". Wildlife monitoring programs will be established on steward's lands.

# CHAPTER 1

# INTRODUCTION

# Introduction

**Brandy L. Downey** and **Richard W. Quinlan**
Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB

MULTISAR is a process to provide appropriate management for multiple species at the landscape level. The first two years (2002-2003, 2003-2004) of the project concentrated on the development of the MULTISAR process through baseline wildlife inventories (Quinlan et al. 2003, Quinlan et al. 2004), building of Habitat Suitability Index (HSI) models (Downey et al. 2004), developing a landscape prioritization for stewardship activities (Multi-species Conservation Value (MCV)) (Jones and Downey 2004), and publishing Beneficial Management Practices (Rangeland Conservation Services Ltd. 2004). The third year of the project saw a shift in focus from development of these tools and processes to the implementation of MULTISAR stewardship activities. During 2004 the first MULTISAR Stewardship Program was initiated on 61,280 acres of the highest priority MCV land. Similar to many other large ranches in the area, a large portion of this land is public and held under grazing disposition. This led to the Public Lands and Forests Division of Alberta Sustainable Resource Development being contacted and invited to join the MULTISAR team to assist in the development and implementation of the Habitat Conservation Strategy. This interdepartmental and interagency cooperation is key to the implementation of MULTISAR, and will facilitate conservation of multiple species across complete project landscapes. The participation of Public Lands and Forests Division allows for the implementation of the MULTISAR habitat conservation strategies on leased land. In an effort to ensure that land managed by the province and private citizens is compliant with both Canada's Species at Risk Act (SARA) and Alberta's Wildlife Act, Conservation Agreements are being developed with cooperating landowners.

The MULTISAR stewardship program is a voluntary program for landowners to conserve wildlife habitat, including habitat for species at risk. A Habitat Conservation Strategy is produced for all private and public land (grazing leases) managed by the participating landowner. A Conservation Agreement is signed with the participating landowner to formally recognize that the landowner is actively protecting species at risk. This Conservation Agreement also describes each partner's role and provides for security of conservation investments.

In 2004-2005 the Government of Canada Habitat Stewardship Program, Alberta Fish and Wildlife's Species at Risk Program, the Alberta Conservation Association, and the North American Waterfowl Management Plan funded MULTISAR. In 2005-2006 additional financial sponsors and delivery partners are being sought for MULTISAR from the industrial, government, and conservation sectors.

## 2.0 LITERATURE CITED


Downey, B.A., B.L. Downey, R.W. Quinlan, O. Castelli, V. J. Remesz and P.F Jones (eds.). 2004. A multi-species conservation strategy for species at risk in the Milk River basin: habitat suitability models for selected wildlife management species. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 86, Edmonton, AB.135 pp.

Jones, P.F. and B.L. Downey. 2004. Multi-species Conservation Value, pages 102-107 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Quinlan, R.W., B.A. Downey, B.N. Taylor, P.F. Jones and T.B. Clayton (eds.). 2003. A multi-species conservation strategy for species at risk in the Milk River Basin: Year 1 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 72, Edmonton, AB. 229 pp.

Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB. 111 pp.

Rangeland Conservation Service Ltd. 2004. Beneficial Management Practices for the Milk River Basin, Alberta: A component of the Multi-Species Conservation Strategy for Species At Risk in the Milk River Basin (MULTISAR). Unpublished report prepared for Alberta Fish and Wildlife Division and Alberta Conservation Association. Airdrie, AB. 369 pp.

# Study Area: The Milk River Basin

**Brad N. Taylor,** Alberta Conservation Association, Blairmore, AB
and
**Brad A. Downey,** Alberta Conservation Association, Lethbridge, AB

## 1.0 GENERAL

The study area includes the Milk River Basin (Figure 1.1) in southern Alberta, Canada. It is approximately 6,776 $km^2$ in size and the boundaries extend north from the United States border along the Saskatchewan border to Cypress Hills Provincial Park and west from the Saskatchewan border to Whiskey Gap. During the second year of study the project boundaries were extended northwest to incorporate the entire area of the Milk River Ridge.

**Figure 1.1:** Milk River Basin Study Area

## 2.0 RIVERS AND STREAMS

The Milk River Basin is unique to Alberta, in that it is part of the Mississippi Watershed flowing into the Gulf of Mexico. Within Alberta, it includes the North Milk and Milk rivers. The two forks join approximately 20 km west of the town of Milk River. The North Milk River is approximately 90 km in length, while the Milk River is approximately 271 km long (Clayton and Ash 1980). Some of the main tributaries to the Milk River include: Red Creek, Lodge Creek, Sage Creek, Shanks Creek, MacDonald Creek, Breed Creek, Deer Creek, Bear Creek, Police Creek, Lonely Valley Creek, and Lost River.

# Study Area: The Milk River Basin

**Brad N. Taylor,** Alberta Conservation Association, Blairmore, AB
and
**Brad A. Downey,** Alberta Conservation Association, Lethbridge, AB

## 1.0 GENERAL

The study area includes the Milk River Basin (Figure 1.1) in southern Alberta, Canada. It is approximately 6,776 $km^2$ in size and the boundaries extend north from the United States border along the Saskatchewan border to Cypress Hills Provincial Park and west from the Saskatchewan border to Whiskey Gap. During the second year of study the project boundaries were extended northwest to incorporate the entire area of the Milk River Ridge.

**Figure 1.1:** Milk River Basin Study Area

## 2.0 RIVERS AND STREAMS

The Milk River Basin is unique to Alberta, in that it is part of the Mississippi Watershed flowing into the Gulf of Mexico. Within Alberta, it includes the North Milk and Milk rivers. The two forks join approximately 20 km west of the town of Milk River. The North Milk River is approximately 90 km in length, while the Milk River is approximately 271 km long (Clayton and Ash 1980). Some of the main tributaries to the Milk River include: Red Creek, Lodge Creek, Sage Creek, Shanks Creek, MacDonald Creek, Breed Creek, Deer Creek, Bear Creek, Police Creek, Lonely Valley Creek, and Lost River.

## 3.0 TOPOGRAPHY

Badlands, plains, uplands, and valleys are all components of the basin. Badlands are evident primarily in the downstream section near Lost River and are characterized by steep slopes and heavily eroded areas. Gently undulating plains are present in the northeast corner of the basin south of Cypress Hills Provincial Park and in the west central portion of the drainage surrounding the town of Milk River. Uplands, characterized by rolling hills, occur in the south-central portion of the drainage as an effect of the Sweet Grass Buttes in Montana and in the north-western part along the Milk River Ridge. Many areas along the valleys of the Milk River and tributaries contain eroded sandstone cliffs and hoodoos. This is particularly evident in the Writing-on-Stone Provincial Park area.

## 4.0 VEGETATION

The Milk River Basin is located within the Grassland Natural Region and contains areas of the Dry Mixed Grass, Mixed Grass, and Foothills Fescue subregions (Achuff 1994). The dry mixed grass ecoregion encompasses the largest area within the drainage and is represented by both short grass, such as blue grama *(Bouteloua gracilis)*, and mid-grasses like western wheat grass *(Agropyron smithii)*, June grass *(Koeleria macrantha)*, and spear grass *(Stipa spp.)*. The mixed grass ecoregion is only found in the northeast corner of the basin near the Cypress Hills and in the south central area north of the Sweet Grass Buttes. It contains similar vegetation as the dry mixed grass subregion however, more western porcupine grass *(Stipa curtiseta)* and northern wheat grass *(Agropyron dasystachyum)* are found in this ecoregion resulting from the slightly moister and cooler climate. The fescue ecoregion makes up a small percentage of the basin's total area. This ecoregion is found in the western part of the basin and is dominated by grasses such as rough fescue *(Festuca scabrella)*, Idaho fescue *(Festuca idahoensis)*, Parry's oatgrass *(Danthonia parryi)* and intermediate oatgrass *(Danthonia intermedia)*. Differences in vegetative communities are representative of differences in soils and climate (Achuff 1994).

Most of the shrubs and trees found in the study area are natural communities of thorny buffaloberry *(Shepherdia argentea)*, willow *(Salix spp.)*, and cottonwoods *(Populus spp.)* scattered along the riparian zones and valley draws in the basin. Silver sagebrush (*Artemesia cana*) is also prevalent throughout the basin and particularly extensive in the southeast corner of the basin. Other shrub species found in the basin include rose *(Rosa spp.)*, buckbrush *(Symphoricarpos occidentalis)*, saskatoon *(Amelanchier alnifolia)*, chokecherry *(Prunus virginiana)*, and skunkbrush *(Rhus trilobata)*.

Numerous forb species are present throughout the basin, two of which are of particular interest, western blue flag (*Iris missouriensis*) and soapweed (*Yucca glauca*). Both species are restricted to the Milk River Basin in southern Alberta.

Introduced species, such as common caragana *(Caragana arborescens)*, Manitoba maple (*Acer negundo*), Russian olive *(Elaeagnus angustifolia)*, and Siberian elm *(Ulmus rubra)*

are found primarily in shelterbelts and hedgerow plantings within fields or around active or abandoned farmyards. Russian olive is becoming a concern in areas where it is found in riparian zones. Other weedy species such as spotted knapweed (*Centaurea maculosa*) and yellow toadflax (*Linaria vulgaris*) are beginning to appear in the western portion of the basin (M. Uchikura, pers. comm).

## 5.0 LAND USE

The study area is sparsely populated with only two towns, Milk River and Coutts, and the small community of Del Bonita located within its boundaries. The primary land use in the Milk River Basin is cattle grazing. Three large provincial grazing reserves (Pinhorn, Sage Creek, and Twin River), an Agriculture and Agri-food Canada research substation (Onefour), as well as numerous grazing leases preserve some of the natural grasslands. Only around 30 percent of the basin is cultivated and this activity is primarily centered around the town of Milk River. Oil and gas activity is present throughout the basin to a small degree; however, drilling activity appears to be on the increase. Several important ecological areas also occur within the study area including: Writing-on-Stone Provincial Park, portions of Cypress Hills Provincial Park, the Milk River Natural Area, and Kennedy Coulee Ecological Reserve.

## 6.0 LITERATURE CITED

Achuff, P.L. 1994. Natural regions, subregions and natural history themes of Alberta: a classification for protected areas management (revised December 1994). Prepared for Alberta Environmental Protection, Parks Services. 72 pp.

Clayton, T.D. and G.R. Ash. 1980. A fisheries overview of the Milk River Basin. Prepared for Alberta Environment, Planning Division, Edmonton, AB. 93 pp + App.

## 7.0 PERSONAL COMMUNICATIONS

Uchikura, M. Riparian Resource Technician, Alberta Riparian Habitat Management Program, Lethbridge, AB.

# CHAPTER 2

# WILDLIFE INVENTORIES

# Aerial Raptor Survey: 2004

**Brad A. Downey**, Alberta Conservation Association, Lethbridge, AB
and
**Richard W. Quinlan**, Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB

## 1.0 INTRODUCTION

Aerial surveys conducted in 2000, 2002, 2003, and 2004 have provided information on cliff nesting raptors along the Milk River (Erickson 2000, Quinlan et al. 2002, Downey and Quinlan 2003). The Milk River valley is difficult to survey through conventional means such as vehicles or walking due to its length and limited access. Aerial surveys have proven to be the most cost effective and time efficient method. This survey provides population trend data on nesting raptors and highlights key areas in which conservation and stewardship activities may be warranted.

## 2.0 METHODS

Aerial surveys were conducted using a Bell 206 helicopter along the Alberta portion of the Milk River mainstem and some associated coulees that provided suitable nesting sites. The 2004 survey was carried out in the area between Deer Creek Bridge and the Milk River airport. The upstream portion, which had been flown in previous years, was not done in 2004 due to limited funding.

Cliffs suitable for nesting were searched by flying the helicopter along the cliff face and watching for birds flushing from the cliff or adults, young, eggs, or nests. Trees and shrubs along the main stem were also surveyed for nests and birds. All individual raptors and nests were recorded, along with Canada goose (*Branta Canadensis*) nests. Two observers and one pilot participated in the survey. One observer was located in the left front seat of the helicopter to navigate and observe while the other observer was located in the right rear seat to observe and record sightings. Surveys were conducted from 0746-1620 hours on June 2. Fuel drums were hauled by truck to strategic locations along the survey route in order to reduce flying time.

UTM coordinates for observations were recorded using Garmin Plus II GPS units. The specific co-ordinates are stored in the Lethbridge Wildlife database and in the Biodiversity Species/ Observation Database (BSOD). Any request for specific locations should be made to the Alberta Fish and Wildlife Division's Lethbridge Wildlife Biologist.

## 3.0 RESULTS

A total of 6.2 hours of helicopter time was required to complete the aerial raptor survey of this portion of the Milk River Basin. Conditions were clear with excellent visibility and winds around 10km/hr. Temperatures ranged from 9°C at the start to 23°C at the end.

Six raptor species were detected during the 2004 survey for a total of 71 individual raptors (Table 2.1). The most numerous were 19 prairie falcons (*Falco mexicanus*) and 19 American kestrels (*Falco sparverius*) followed by 11 great horned owls (*Bubo virginianus*), 10 red-tailed hawks (*Buteo jamaicensis*), 7 golden eagles (*Aquila chrysaetos*), and 5 ferruginous hawks (*Buteo regalis*) (Table 2.1). One historical peregrine falcon (*Falco peregrinus*) nest site was also surveyed but it was being used by prairie falcons.

**Table 2.1:** Number of raptors observed on the Milk River 2004 aerial raptor survey between Deer Creek Bridge and Milk River Airport.

| Species | # Adults | # Nests | # Young | # Eggs |
|---|---|---|---|---|
| Ferruginous Hawk | 5 | 3 | 9 | 0 |
| Prairie Falcon | 19 | 6 | 13 | 0 |
| Golden Eagle | 7 | 1 | 1 | 0 |
| Red-tailed Hawk | 10 | 4 | 8 | 0 |
| American Kestrel | 19 | 6 | 0 | 0 |
| Great Horned Owl | 11 | 3 | 3 | 2 |

An increased number of adult ferruginous hawks, great horned owls, American kestrels, red-tailed hawks, and golden eagles were observed in 2004. The numbers of prairie falcons have remained fairly constant whereas Swainson's hawks (*Buteo swainsoni*) have become absent in the last two years (Table 2.2).

**Table 2.2:** The numbers of raptors observed from the Deer Creek Bridge to the Milk River Airport over the four-year aerial surveys.

| Species | 2000 | 2002 | 2003 | 2004 |
|---|---|---|---|---|
| Ferruginous Hawk | 1 | 3 | 2 | 5 |
| Great Horned Owl | 1 | 4 | 4 | 11 |
| Golden Eagle | 1 | 7 | 1 | 7 |
| American Kestrel | 5 | 16 | 11 | 19 |
| Prairie Falcon | 13 | 18 | 21 | 19 |
| Red-tailed Hawk | 0 | 7 | 1 | 10 |
| Swainson's Hawk | 2 | 4 | 0 | 0 |

There were 23 active raptor nests recorded in 2004 compared to 19 nests in 2003, 16 in 2002, and 13 in 2000 for the same area (Table 2.3). Fifteen empty stick nests on cliffs and the ground and one empty stick nest in a tree were observed in 2004 (Appendix A).

**Table 2.3:** The number of raptor nests observed from the Deer Creek Bridge to the Milk River Airport over fours years of aerial surveys.

| Species | 2000 | 2002 | 2003 | 2004 |
|---|---|---|---|---|
| Ferruginous Hawk | 1 | 1 | 2 | 3 |
| Great Horned Owl | 1 | 0 | 2 | 3 |
| Golden Eagle | 1 | 1 | 2 | 1 |
| American Kestrel | 0 | 0 | 0 | 6 |
| Prairie Falcon | 9 | 11 | 11 | 6 |
| Red-tailed Hawk | 0 | 2 | 2 | 4 |
| Swainson's Hawk | 1 | 1 | 0 | 0 |

## 4.0 DISCUSSION AND RECOMMENDATIONS

There were more ferruginous hawk nests between Deer Creek Bridge and Milk River Airport in 2004 than in previous surveys. This may be a sign of increased nesting success or that a slight shift in the population distribution is occurring. This was not confirmed since surveys in the upper portions of the Milk River, which contain high densities of ground nesting ferruginous hawks, were not conducted in 2004. Surveys in 2005 will focus on the area upstream of the Milk River airport. Prairie falcon nests have dropped from eleven nests to six nests, which is the lowest on record for the area surveyed, however the number of adults seen remains fairly steady. Survey conditions were ideal in 2004 with the helicopter being able to maneuver into coulees, which was not possible in the other years.

Aerial surveys continue to be an effective and efficient way to inventory cliff-nesting raptors along the Milk River. Data collected through aerial surveys has enabled MULTISAR staff to learn the significant role these cliffs play in supporting nesting sites for raptors in a rather sparsely treed region of Alberta. These key-breeding areas for prairie falcons and ferruginous hawks should be monitored annually in order to determine population trends of cliff nesting raptors.

## 5.0 LITERATURE CITED

Downey, B.A. and R.W. Quinlan. 2004. Aerial surveys of the Milk River Basin-2003. Pages 8-15 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, a multi-species conservation strategy for species at risk: year 2-progress report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Erickson, G.L. 2000. 2000 Prairie Region Peregrine Falcon Survey. Alberta Species At Risk Program. Lethbridge, AB. 23 pp.

Quinlan, R.W., G.L. Erickson, and B.N. Taylor. 2003. Milk River 2002 Aerial Raptor Survey. Pages 73-84 *In* Quinlan, R.W., B.A. Downey, B.N. Taylor, P.F. Jones, and T.B. Clayton (eds.). 2003. A multi-species conservation strategy for species at risk in the Milk River Basin: Year 1-progress report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 72, Edmonton, AB.

## APPENDIX A- Aerial Survey Observations

## APPENDIX A- Aerial Survey Observations

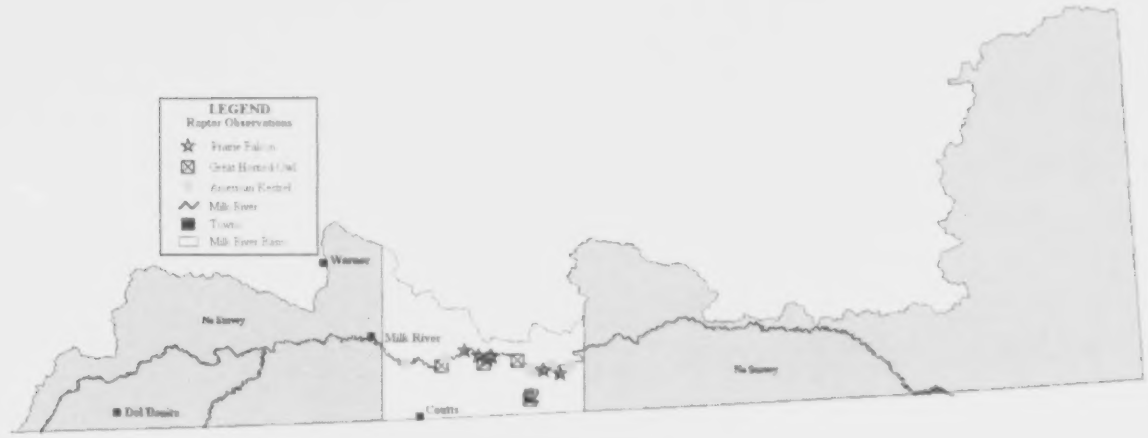
LEGEND
Inactive Nests
Warner
No Survey
Milk River
No Survey
Del Bonita
Coutts

LEGEND
Raptor Observations
Warner
No Survey
Milk River
No Survey
Del Bonita
Coutts

LEGEND
Raptor Observations
Warner
No Survey
Milk River
No Survey
Del Bonita
Coutts

LEGEND
Inactive Nests
Tree
Ground
Milk River
Towns
Milk River Basin
Warner
No Survey
Milk River
No Survey
Del Bonita
Coutts

LEGEND
Raptor Observations
Golden Eagle
Red-tailed Hawk
Milk River
Towns
Milk River Basin
Warner
No Survey
Milk River
No Survey
Del Bonita
Coutts


LEGEND
Raptor Observations
Prairie Falcon
Great Horned Owl
American Kestrel
Milk River
Towns
Milk River Basin
Warner
No Survey
Milk River
No Survey
Del Bonita
Coutts

# Burrowing Owl Surveys in the Milk River Basin: 2004

**Brandy L. Downey**, Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB

## 1.0 INTRODUCTION

The burrowing owl (*Athene cunicularia hypugaea*) was once widespread throughout the Canadian prairies, however due to changes in land management, habitat destruction and pesticides it has declined over its entire range (Wellicome 1997). The burrowing owl is currently considered "At Risk" in Alberta and is legislated in Alberta's Wildlife Act as "Threatened" (Alberta Sustainable Resource Development 2001, Fish and Wildlife Division 2004). Nationally it is an "Endangered" species (COSEWIC 2004). In 2003 no burrowing owls were found during the roadside surveys in the Milk River Basin (Downey 2004b). This was attributed to limited manpower, time constraints, the abundance of potential habitat and suspected low population densities. Several recommendations were taken into account in order to better suit the survey method to the MULTISAR project in 2004.

## 2.0 METHODS

The roadside survey method is based on the Nicholson and Skiftun (2001) surveys. However this method favors well-used roadways, which may have biased the survey (Downey 2004b). Due to this only two surveys were conducted along main access roads this year. The two routes were a variation of Nicholson and Skiftun's routes 1 and 2 surveyed in 2001. The routes were altered slightly in order to survey areas not covered during other MULTISAR grassland bird surveys and to allow the routes to be completed in 2 days. In addition two routes were planned along trails on a MULTISAR steward's land (RD1 and RD2).

Surveys were conducted from 06:00 until 13:00 hours, from May 15 to June 17. Weather measurements were taken at both the start and end of the survey using a wind/temperature gauge; with additional measurements being taken if there were changes during the survey (Nicholson and Skiftun 2002). Persistent winds over 20 km/hour, and steady rain was considered unsuitable for the survey (Scobie and Russell 2000). Based on the 2001 survey protocol observation points were designed a kilometer apart and a 5-5-2 method of observation was utilized at each stop (Duxbury and Holroyd 2001, Nicholson and Skiftun 2002, Downey 2004b). The observer scanned for 5 minutes, followed by 5 minutes of call playback and a two-minute final scan. To cover the entire area of each stop, the call playback and scanning occurred in a 360-degree radius (Nicholson and Skiftun 2002). If a burrowing owl was detected the location was recorded using a GPS unit in NAD 83 UTM coordinates. The owls were observed and the number of birds, behavior, and burrow location was recorded. The sites were revisited periodically throughout the summer to monitor their status.

## 3.0 RESULTS

One burrowing owl nest was detected during roadside surveys in 2004. The nest was located near a dirt trial on a MULTISAR steward's land. Another 2 owls were observed during the roadside surveys however no nests were found. Two additional nests were detected during other wildlife surveys within the basin. A fourth nest was found by a landowner and reported to MULTISAR staff. Observations over the summer confirmed 3 of the 4 nests raised young to fledging, with a total of 16 young of the year. One nest was not checked for young, as it was difficult to observe without disturbing the birds. Other species recorded during the burrowing owl surveys included several Sprague's pipit (*Anthus spragueii*), long-billed curlew (*Numenius americanus*), Richardson's ground squirrel (*Spermophilus richardsonii*), American Badger (*Taxidea taxus*), Baird's Sparrow (*Ammodramus bairdii*), and ferruginous hawk (*Buteo regalis*).

In addition to surveys conducted by MULTISAR staff, several other agencies found burrowing owls within the basin in 2004. Operation Grassland Community (OGC) reported 11 pairs occurring inside or just outside the basin (Lindsay Tomlyn pers. comm.). Surveys conducted by the Canadian Wildlife Service (CWS) on provincially leased land found 1 additional nest within the basin limits (Troy Wellicome pers. comm.).

## 4.0 DISCUSSION

The ratio of owls to survey effort was much lower during the 2004 surveys than in 2001 and 2003 (Nicholson and Skiftun 2002, Downey 2004b). This may be attributed to the increased amount of time spent in high priority areas as identified by the burrowing owl Habitat Suitability Index (HSI) model (Skiftun 2004). However most burrowing owls were detected as incidentals during other surveys. These random sightings of owls throughout the basin shows that there is higher use of the basin than what has been found during roadside surveys. Therefore in addition to the continuation of the current roadside surveys "game callers" should be carried with MULTISAR field staff at all times. This will allow random areas of potentially suitable habitat to be sampled, increasing the area sampled and probability of detection. This method has been successful at finding loggerhead shrikes (*Lanius ludovicianus*) that are also sporadically distributed throughout the basin (Downey 2004a).

Continued collaborative efforts of multiple government and conservation agencies is required to better determine the number of burrowing owls throughout the Milk River Basin and the province. The cooperation between MULTISAR, OGC, individual landowners and CWS has increased the number of owls recorded within the basin without increasing survey effort to the project. These collaborative efforts should be expanded to include stewardship programs such as MULTISAR as a means to effectively manage the species throughout the basin.

## 5.0 FUTURE MANAGEMENT RECOMMENDATIONS

- Continue roadside surveys on existing routes.

- Initiate new routes on or along MULTISAR steward's lands.
- Initiate random point surveys in areas of suitable habitat.
- Continue to share information and collaborate with other government agencies and conservation groups in order to understand the burrowing owl's presence within the basin.
- Use the MULTISAR stewardship program to protect key habitat for the burrowing owl.

## 6.0 LITERATURE CITED


Alberta Sustainable Resource Development. 2001. The General Status of Alberta Wildlife Species 2000. Alberta Sustainable Resource Development, Fish and Wildlife Service, Edmonton, AB. 46pp. Publication No. I/023.

COSEWIC. 2004. Canadian Species at Risk, May 2004. Committee on the Status of Endangered Wildlife in Canada. 43 pp.

Downey, B. A. 2004a. Loggerhead Shrike Surveys Within the Milk River Basin, pages 39-50 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Downey, B.L. 2004b. Burrowing Owl Surveys in the Milk River Basin, pages 16-24 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Duxbury, J. M. and G. Holroyd. 2001. A standardized, roadside burrowing owl survey technique. Unpublished report. Canadian Wildlife Service, Environment Canada, Edmonton, AB.

Fish and Wildlife Division. 2004. Report of Alberta's Endangered Species Conservation Committee: June 2002. Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, AB. 40 pp.

Nicholson, J. and C. Skiftun. 2002. Utilisation of a Roadside Survey Technique to Survey Burrowing Owl (*Athene cunicularia hypugaea*) in Southeastern Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No.54. Edmonton, AB. 13 pp.

Scobie, D. and R. Russell, 2000. Burrowing Owl Trend Block Surveys and Monitoring, Brooks and Hanna Areas. Alberta Sustainable Resource Development, Fisheries and Wildlife Management Division, Alberta Species at Risk No. 8, Edmonton AB. 11 pp.

Skiftun, C. L. 2003. The Burrowing Owl. Pages 13-19 *in* Downey B. A., B. L. Downey, R. W. Quinlan, O. Castelli, V. J. Remesz and P. F. Jones (eds.). 2004. MULTISAR: The Milk River Basin Habitat Suitability Models for Selected Wildlife Management Species. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 86, Edmonton, AB. 135 pp.

Wellicome, T. I. 1997. Status of the Burrowing Owl (*Speotyto cunicularia hypugaea*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report No. 11, Edmonton, AB. 21pp.

## 7.0 PERSONAL COMMUNICATION

Lyndsay Tomlyn, Operation Grassland Community, Edmonton, Alberta, 2004.

Troy Wellicome, Canadian Wildlife Services, Edmonton, Alberta, 2004.

# Ferruginous Hawk and Richardson's Ground Squirrel Surveys in the Milk River Basin

**Brad A. Downey**, Alberta Conservation Association, Lethbridge, AB
and
**Brandy L. Downey,** Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB

## 1.0 INTRODUCTION

Richardson's ground squirrels (*Spermophilus richardsonii*) are distributed throughout the grasslands and are a key component of the prairie ecosystem. The Richardson's ground squirrel is a vital prey source for many species including the ferruginous hawk (*Buteo regalis*), which is a bird of the open prairies (Michener and Schmutz 2002). The ferruginous hawk is a "Threatened" species in Alberta and a species of "Special Concern" in Canada (COSEWIC 2004, Fish and Wildlife Division 2004). Ferruginous hawk populations have decreased significantly from their historical size (Schmutz 1984). On the provincial level, quadrat surveys for ferruginous hawk have been conducted in 1982, 1987, 1992, and 2000. These surveys exhibited a population drop between 1992 and 2000 (Stepnisky et al. 2002, Taylor 2003, Downey 2004b). This population decline was also supported by the ferruginous hawk population estimate derived from a 2001 inventory aimed primarily at developing a population estimate for long-billed curlew, as well as Christmas bird count data from the hawks wintering habitats (Saunders 2001, Taylor 2003). The Milk River Basin includes one of the few large fairly continuous blocks of native prairie in Alberta and represents a key area for ferruginous hawks in the province. Surveys for the hawk and ground squirrel were completed in 2004 to monitor their trends and status within the basin. They were initiated in 2003 for Richardson's ground squirrels and 2002 for ferruginous hawks.

## 2.0 METHODS

### 2.1 Richardson's Ground Squirrel surveys

Emergence of young Richardson's ground squirrels may vary 2-3 weeks between years depending on the severity of the winter and geographic location (Michener and Schmutz 2002). Surveys were therefore conducted during the first three weeks of April to ensure that all adult Richardson's ground squirrels had emerged from hibernation. This allowed the maximum adult density to be assessed each year. April surveys of adults were chosen to alleviate the high annual variation that could result later in the spring through recording of the later-emerging juveniles (Downey 2003).

Morning surveys started 75 minutes after sunrise and ended by 1200 hours. Afternoon surveys were conducted from 1600 hours until 75 minutes prior to sunset. These survey periods correspond with the most active feeding periods for ground squirrels. Due to reduced levels of activity, surveys were not carried out during extremely high temperatures ($\geq$30 $^{o}$C), nor were surveys done when winds exceeded 30km/hr, or when it was snowing or raining (Downey 2003).

Surveys involved an observer driving and stopping every 800m along a 12.8km predetermined transect, with a GPS location taken at each stop. The observer used binoculars and started the survey at a recognizable point then rotated around 360 degrees (four 90° quadrants) counting each ground squirrel within 200m during a 2-minute period. In cases where quadrants couldn't be surveyed the full 200m due to obstructions such as topography the observer continued along the transect (up to 400m from the original site) until he/she could see 200m in each direction. Any changes in the locations of the stops were noted on the data sheet. Regular intervals of stops every 800m were continued from where the original stop was located. The number of Richardson's ground squirrels seen in each quadrant (NE, NW, SE, and SW) was recorded on the data sheet. The dominant habitat for each quadrant and the habitat in which ground squirrels were seen was recorded.

Upon completion of the first count the observer played a recording of the alarm call of an adult Richardson ground squirrel for 30 seconds while facing each quadrant and counting the number of ground squirrels observed. Results of both counts were recorded to determine whether playback of alarm calls assists in increasing detection. A detailed survey protocol can be found in Downey (2003).

## 2.2 Ferruginous Hawk Surveys

The ferruginous hawk survey protocol is based on the method developed by Schmutz (1982) and refined by Taylor (2003). Surveys began in the first week of May and continued to July 10, 2004. At the start of each survey the weather conditions, number of observers, and start times were recorded. Surveys were cancelled during periods of rain or snow and when winds exceeded 6 on the Beaufort scale. Each quadrat was 6.4km by 6.4km in size with all roads within the quadrat being traveled, and foot access to areas not visible from the road. Raptors observed were recorded on the ferruginous hawk data sheet and plotted on the corresponding quadrat map. Locations of raptors were recorded using a Garmin GPS unit in Universal Transverse Mercator (UTM) in Nad 83. Quadrat maps were also updated to reflect structural and land use changes since the last survey period.

If a ferruginous hawk nest was found, a nest habitat data sheet was completed (Downey 2004b). For each nest site, the type of nesting structure utilized, height of the nest, and percentage of various habitat types within an 800m by 800m area of the nest was recorded. Binoculars and spotting scopes were used to reduce disturbances to nesting birds and to help identify active nests. The number of young in each nest was also recorded. Nests were considered active if new material had been added to the nest, a bird was present on the nest, or if young could be seen in the nest. Incidental species within the block were also recorded. At the completion of the survey the end time and weather conditions were recorded. Incidental nest and adult sightings outside the quadrat surveys were also recorded in the Milk River Basin study area.

## 3.0 RESULTS

### 3.1 Richardson's Ground Squirrel

Richardson's ground squirrel surveys occurred along seven transects within the Milk River Basin. Four of the seven transects contained ground squirrels for a total of 66 ground squirrels counted when no alarm call was used and 126 ground squirrels counted when the alarm call was used; almost twice as many. This resulted in an average density of 8.4 adult Richardson's ground squirrels/km² when using the highest count. This density indicates a slight increase in population trends for ground squirrels in the Milk River Basin from an average density of 7.5 adult ground squirrel/km² in 2003.

Seven other surveys conducted along transects adjacent to the basin detected a total of 44 Richardson's ground squirrels when no alarm call was used and 99 ground squirrels when the alarm call was used; more than twice as many. This resulted in an average density of 6.6 adult ground squirrels/km² in 2004 on lands adjacent to the Milk River Basin using the highest count.

Overall, the fourteen transects contain 110 adult ground squirrels when no alarm call was played and 225 adult ground squirrels when alarm call were used. This resulted in a density of 7.5 adult Richardson's ground squirrels/km².

### 3.2 Ferruginous Hawk

Fourteen quadrats were surveyed in 2004, 7 within the Milk River Basin and 7 surrounding the basin. A total of 5 nests and 10 adults were detected on quadrats within the basin. This is a slight increase from the 2003 totals of 3 nests and 4 adults. The seven ferruginous hawk blocks located around the periphery of the basin contained 3 nests and 5 adults.

## 4.0 DISCUSSION

Richardson's ground squirrel surveys have been conducted in the Milk River Basin for two years. During this time surveys with and without the use of alarm calls have been used. Comparisons between the two methods show a significant increase in the number of ground squirrels seen with the use of alarm calls than without (Downey 2004b). In both years almost twice as many squirrels were detected with call playback than without. Continuing with two separate survey methods is time consuming and unnecessary, therefore in future years only call playbacks will be used to survey Richardson's ground squirrels. Analysis of a much larger data set looking at the grassland region of Alberta in 2003 and 2004 revealed similar results in which Richardson's ground squirrels were detected more often and in higher abundance when using call playback (Downey et al., unpublished data).

The seven hawk quadrats surrounding the basin had fewer hawks and ground squirrels than the seven in the Milk River Basin. This may be due to the high amount of native prairie habitat available within the ferruginous hawk blocks in the basin (50%) compared to ferruginous hawk blocks surrounding the basin (20%). Both the Richardson's ground

squirrel and the ferruginous hawk rely heavily on the availability of native prairie habitat (Schmutz 1999, Downey 2004a, Downey 2004b). Due to the amount of highly suitable habitat available, the Milk River Basin is a key management area for the ferruginous hawk and it's main prey.

Surveys within the basin support a positive relationship between ferruginous hawk populations and Richardson's ground squirrel densities. Similar surveys were completed for the Alberta Grassland Natural Region in 2003 and 2004. The analysis of these results showed that increased densities of Richardson's ground squirrels positively influence the ferruginous hawk population. This analysis also looked at a variety of other variables that could influence ferruginous hawks (Downey, unpublished data). This relationship illustrates one importance of Richardson's ground squirrels as a keystone species. Without this healthy prey base the ferruginous hawk population would do poorly. The ecological importance of Richardson's ground squirrels warrants a change in the way many people regard this species. It is often referred to as a "nuisance" but plays a key role in the prairie ecosystem. A balance between the need for the Richardson's ground squirrels on the prairie and the control of it where it is a hindrance in some cultivated areas needs to be encouraged. In key ferruginous hawk areas, such as the Milk River Basin, MULTISAR encourages the maintenance of native prairie habitat and its native wildlife.

## 5.0 FUTURE MANAGEMENT RECOMMENDATIONS

- Call playback should be used as the primary survey methodology for Richardson's ground squirrels.
- A study should be initiated to assess the variance in ground squirrel numbers when using alarm calls at different times of day.
- Surveys should be continued for ferruginous hawk and Richardson's ground squirrels within and outside the Milk River Basin.
- Stewardship programs should be initiated in key areas for ferruginous hawk and their prey.
- Stewardship programs through MULTISAR and other conservation initiatives should emphasize the maintenance of keystone species in important habitat.
- Native prairie habitat should be maintained in all areas of private and public land where it currently exist.
- In some key areas near suitable ferruginous hawk nesting areas, cultivated lands should be rehabilitated to grasslands.

## 6.0 LITERATURE CITED

COSEWIC. 2004. Canadian Species at Risk, May 2004. Committee on the Status of Endangered Wildlife in Canada. 49 pp.

Downey, B.A. 2003. Survey protocol for the Richardson's ground squirrel. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No 69. Edmonton, AB.

Downey, B.A. 2004a. Richardson's ground squirrel trend surveys in the Milk River Basin, Pages 25-31 *In* Quinlan R. W., B. A. Downey, B. L. Downey and P. F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-Species Conservation Strategy For Species at Risk: Year 2- Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Downey, B.L. 2004b. Milk River Basin Ferruginous Hawk Surveys, Pages 25-31 *In* Quinlan R. W., B. A. Downey, B. L. Downey, and P. F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-Species Conservation Strategy For Species at Risk: Year 2- Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Fish and Wildlife Division. 2004. Report of Alberta's Endangered Species Conservation Committee: June 2002. Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, AB. 40 pp.

Michener, G.R. and J.K. Schmutz. 2002. Richardson's ground squirrel- *Spermophilus richardsonii*. Alberta Prairie Conservation Forum- Prairie Notes Online Paper (http://www.albertapcf.ab.ca/prairie_notes.htm).

Saunders, Elizabeth J. 2001. Population estimate and habitat associations of the long-billed curlew (*Numenius americanus*) in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 25. Edmonton, AB.

Schmutz, J.K. 1982. An estimate of ferruginous hawks in Alberta and their relationship between their density and land use. Unpubl. Rept. For the Alberta Environmental Research Trust and Fish and Wildlife Division of Alberta Energy and Natural Resources. Edmonton, AB. 28 pp.

Schmutz, J.K. 1984. Ferruginous and Swainson's hawk abundance and distribution in relation to land use in southeastern Alberta. Journal of Wildlife Management 48(4): 1180-1187.

Schmutz, J.K. 1999. Status of the ferruginous hawk (*Buteo regalis*) in Alberta. Alberta Environmental Protection, Fisheries and Wildlife Management Division, and Alberta Conservation Association, Wildlife Status Report No. 18, Edmonton, AB. 18 pp.

Stepnisky, D.P., G.L. Erickson, J. Iwaasa and B. Taylor. 2002. An evaluation of the ferruginous hawk population in Alberta based on recent trend data. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 52. Edmonton, AB. 16 pp.

Taylor, B.N. 2003. Population estimates and a survey protocol for ferruginous hawks in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No 70. Edmonton, AB.

# Grassland Bird Monitoring Surveys

**Brandy L. Downey,** Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB

## 1.0 INTRODUCTION

Several grassland bird monitoring transects were completed in 2004. The surveys were based on the 2001 long-billed curlew (*Numenius americanus*) inventory protocol (Saunders 2001). The 2001 surveys found that long-billed curlew (a "Species of Special Concern" in Alberta and Canada) abundances were associated with the amount of native prairie habitat available (AESCC 2000, Saunders 2001, COSEWIC 2003). The surveys were also successful at detecting several other bird species of concern. Following the 2001 inventory a monitoring program was developed which was comprised of 20 long-billed curlew routes in Alberta. Eight of these monitoring routes fell within the Milk River Basin and were completed for the MULTISAR project in 2004. Results from the MULTISAR transects were used to supplement the 2004-2005 Continental long-billed curlew survey and the Alberta curlew monitoring program.

These monitoring transects were also used to survey several additional grassland bird species of concern. Other species that were surveyed include ferruginous hawk (*Buteo regalis*), short-eared owl (*Asio flammeus*) burrowing owl (*Athene cunicularia hypugaea*), upland sandpiper (*Bartarmia longicauda*), loggerhead shrike (*Lanius ludovicianus exubitorides*), and Sprague's pipit (*Anthus spragueii*).

## 2.0 METHODS

In 2001, 110 transects were designed for the provincial long-billed curlew inventory, from this 10 transects from each habitat stratum were to be chosen for the annual monitoring program (Saunders 2001). The transects were divided into one of 3 stratums; stratum 1 (0-5% native prairie), stratum 2 (6-50% native prairie) and stratum 3 (51-100% native prairie). Stratum 1 and 2 were found to yield similar results and were combined into one stratum for monitoring. As a result, 20 transects were required for the monitoring program, 8 of which are partially or entirely within the Milk River Basin.

The survey protocol is based on the 2001 transects (Saunders 2001), however a few changes were made due to the continental inventory which was occurring in 2004. First, the survey end date was moved back from June 6 to May 15 so that surveys were conducted between April 25-May 15. Each survey began half an hour before sunrise and on average took 5 hours to complete. At the start of each survey weather conditions were recorded and changes were tracked throughout the survey. Persistent precipitation and winds in excess of 25 km/hour were considered unsuitable. If the survey was over half completed when weather conditions turned unfavorable, it would be included in the final analysis and not repeated.

Each 32km transect was divided into 40 stops, 800m apart. At each stop the observer would listen and scan for a total of 5 minutes. If a species of interest was detected the stop number, number of birds, sex, activity, habitat and distance from the observation point was recorded on the long-billed curlew data sheets. All birds identified within 800m or less were recorded. In the case of long-billed curlews only males were included in the analysis as females tend to incubate the nest during the day and are therefore less visible (Saunders 2001). In addition, only individuals within 400m of the observer were included in the analysis. Weather conditions, end time and the number of stops were recorded at the end of each survey.

The data was then used to determine population trends by utilizing linear regressions to conduct t-tests on the data (Cerney and Jones 2003). These were used to illustrate whether the population was increasing, decreasing or if there is no change between sample years. In order to prevent inconsistencies the routes should be resampled within $^{+}/_{-}$5 days of the original survey. Habitat use was analyzed using Chi-square and the Bonferoni 95% confidence interval tests (Neu et al. 1974)

## 3.0 RESULTS

Seven of the eight routes in the Milk River Basin were surveyed in 2004. One route was not completed due to wet weather. Along the seven routes completed, 24 long-billed curlews were detected. Other species detected included 108 Sprague's pipits, 5 ferruginous hawks, 2 loggerhead shrikes, 1 burrowing owl and 6 upland sandpipers (Table 2.4). Four additional routes were conducted in the Milk River Basin in 2004 as part of the continental curlew survey, on which 26 curlews, 7 Sprague's pipit, 1 ferruginous hawk and 1 short-eared owl were detected. These four routes were not included in the population trend analysis.

Single sample t-tests were conducted to determine trends for 5 of the 7 species targeted during the grassland surveys. Tests were not done for the short-eared owl and burrowing owl due to insufficient data. The tests showed no significant difference between survey years for Sprague's pipit ($t = 2.416$; $P = 0.060$), ferruginous hawk ($t = 0.583$; $P = 0.585$), long-billed curlew ($t = 0.865$; $P$=0.426), loggerhead shrike ($t = 0.284$; $P = 0.788$), and upland sandpiper ($t = 0.678$; $P = 0.528$)(Table 2.4).

**Table 2.4**: Milk River Basin grassland bird survey results from 2001-2004

| Year | # Of Routes | LBCU | SPPI | SEOW | FEHA | LOSH | BUOW | UPSA |
|---|---|---|---|---|---|---|---|---|
| 2001 | 8 | 22 | 14 | 0 | 10 | 0 | 0 | 3 |
| 2002 | 8 | 0 | 57 | 0 | 5 | 5 | 0 | 0 |
| 2003 | 7 | 25 | 54 | 4 | 7 | 2 | 0 | 3 |
| 2004 | 7 | 24 | 108 | 0 | 5 | 2 | 1 | 6 |
| P-value | | 0.426 | 0.06 | N/A | 0.585 | 0.788 | N/A | 0.528 |

Chi-square tests were conducted to determine habitat use of all the grassland bird species as a group. Separate Chi-square tests were also conducted on the long-billed curlew, Sprague's pipit and ferruginous hawks. Tests were not done for the burrowing owl,

upland sandpiper, loggerhead shrikes and short-eared owl due to a lack of data; however these species were included in the group analysis. Native prairie was used more often than proportionally available ($\chi^2 = 132.07$, $P < 0.001$) and cultivation less then proportionally available for grassland birds as a group (Appendix B). Similar results were found for the long-billed curlew ($\chi^2 = 7.27$, $P < 0.001$), Sprague's pipit ($\chi^2 = 94.64$, $P < 0.001$), upland sandpiper ($\chi^2 = 5.63$, $P = 0.004$) and ferruginous hawks ($\chi = 6.27$, $P = 0.002$).

## 4.0 DISCUSSION

Though roadside surveys provide an adequate survey method for the long-billed curlew and other grassland birds, the surveys were designed as a species specific monitoring program and may not accurately reflect the trends of other grassland species. The original survey was designed around the curlews nesting period, which begins in late April (Hill 1998). This differs from some of the other target species like the Sprague's pipit, which does not reach its nesting grounds until mid May (Prescott 1997). Therefore routes completed in the first half of the survey period may either be missing or over counting these species, which could still be migrating. In order to avoid this, surveys should be completed between May 15-May 30. This will ensure all target species have properly dispersed across the nesting grounds. However this conflicts with the long-billed curlew Continental surveys that will be continued in 2005, which require surveys to be completed prior to May 15. To meet the continental survey criteria survey dates will remain between April 30-May 15 for 2005, after which the dates will be altered to reflect all grassland birds inventoried (May 15-May 30).

The surveys further supported the positive relationship between grassland birds and native prairie habitat. Chi-square tests illustrate that grassland birds were detected in native prairie greater than the habitat was proportionally available. Similar results were found at the provincial scale (Saunders 2001). Due to the importance of native prairie habitat, steps should be taken to ensure the conservation of native prairie within the basin. This includes education of landowners to the importance of native prairie habitat, use of industrial guidelines, restrictions to limit habitat destruction and the initiation of stewardship programs such as the MULTISAR stewardship program on both private and public lands.

## 5.0 FUTURE MANAGEMENT RECOMMENDATIONS

- Surveys will be conducted between April 30-May 15 based on the criteria for the long-billed curlew continental survey in 2005 only.
- Conduct annual monitoring surveys between May 15-May 30 starting in 2006.
- Maintain grassland bird habitat on current MULTISAR steward's land.
- Initiate MUTLISAR stewardship programs in other areas of suitable habitat.
- A provincial policy to protect all remaining native grasslands is recommended.

## 6.0 LITERATURE CITED


Alberta Endangered Species Conservation Committee. 2000. Long-Billed Curlew Initial Conservation Action Statement. Recommended to the Minister Environment (now Minister of Sustainable Resource Development). 2 pp.

Alberta Sustainable Resource Development. 2001. The General Status of Alberta Wildlife Species 2000. Alberta Sustainable Resource Development, Fish and Wildlife Service, Edmonton, AB. 46 pp. Publication No I/023.

Cerney, L.D. and P.F. Jones. 2003. Native prairie stewardship program: sharp-tailed grouse dancing ground survey 2001-2002. Internal report. Alberta Conservation Association, Southern Business Unit. Lethbridge, Alberta. 34 pp.

COSEWIC. 2003. Canadian Species at Risk, May 2003. Committee on the Status of Endangered Wildlife in Canada. 43 pp.

Downey, B.L. 2004. Long-billed curlew monitoring surveys, Pages 32-38 *In* Quinlan R.W., B.A. Downey, B.L. Downey and P.F. Jones.2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Hill, D.P. 1998. Status of the Long-Billed Curlew (*Numenius americanus*) in Alberta. Alberta Environmental Protection, Fisheries & Wildlife Management Division and Alberta Conservation Association, Wildlife Status Report No. 16, Edmonton, AB. 20 pp.

Neu, W.C, C.R. Byers and J.M. Peek. 1974. A technique for analysis of utilization availability data. Journal of Wildlife Management 38(3) 541-545.

Prescott, D.R.C. 1997. Status of the Sprague's Pipit (*Anthus spragueii*) in Alberta. Alberta Environment Protection, Wildlife Management Division, Wildlife Status Report No. 10, Edmonton, AB. 14 pp.

Saunders, E.J. 2001. Population estimate and habitat associations of the long-billed curlew (*Numenius americanus*) in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife division, Alberta Species at Risk Report No. 25. Edmonton, AB.

## APPENDIX B- Chi-Square analysis and Bonferoni 95% Confidence Intervals for various Grassland Bird Species

**Grassland Birds**

| Habitat | % Habitat available | # of Birds Observed | Expected | $X^2$ | Bonferoni 95% confidence intervals LL-UL | Category |
|---|---|---|---|---|---|---|
| Native Prairie | 48% | 251 | 123.36 | 132.0685 | 0.84-0.96 | Greater |
| Cultivation | 42% | 22 | 107.94 | 68.42397 | 0.023-0.13 | Less |
| Other | 10% | 3 | 25.70 | 20.05019 | -0.01-0.03 | Less |
| Sum | 1 | 276 | 257 | 221 | | |

**Long-billed curlew**

| Habitat | % Habitat available | # of LBCU Observed | Expected | $X^2$ | Bonferoni 95% confidence intervals LL-UL | Category |
|---|---|---|---|---|---|---|
| Native Prairie | 48% | 51 | 35.04 | 7.269452 | 0.60-0.79 | Greater |
| Cultivation | 42% | 19 | 30.66 | 4.434299 | 0.07-0.35 | Less |
| Other | 10% | 3 | 7.30 | 2.532877 | -0.00-0.08 | Less |
| Sum | 1 | 73 | 73 | 14 | | |

**Sprague's pipit**

| Habitat | % Habitat available | # of SPPI Observed | Expected | $X^2$ | Bonferoni 95% confidence intervals LL-UL | Category |
|---|---|---|---|---|---|---|
| Native Prairie | 48% | 168 | 80.64 | 94.64 | 1.00 | Greater |
| Cultivation | 42% | 0 | 70.56 | 70.56 | 0 | Less |
| Other | 10% | 0 | 16.80 | 16.8 | 0 | Less |
| Sum | 1 | 168 | 168 | 182 | | |

**Ferruginous hawks**

| Habitat | % Habitat available | # of FEHA Observed | Expected | $X^2$ | Bonferoni 95% confidence intervals LL-UL | Category |
|---|---|---|---|---|---|---|
| Native Prairie | 48% | 16 | 8.64 | 6.26963 | 0.82-0.95 | Greater |
| Cultivation | 52% | 2 | 9.36 | 5.78735 | 0.05-0.18 | Less |
| Sum | 1 | 18 | 18 | 12 | | |

# Identification of Small Mammals Through the Analysis of Owl Pellets

**Roy Schmelzeisen** and **Amanda Rezansoff**
Alberta Conservation Association, Edmonton, AB

## 1.0 INTRODUCTION

Owl pellets collected from 7 sites in 2003 were dissected and analyzed in order to discern local small mammal populations in the Milk River Basin of Alberta. The examination of owl diets through analysis of pellets dropped around roost or nest sites is a fairly new technique for determination of species distribution and relative abundance. This inexpensive method of collection, which also requires little manpower, has increased the known distribution and relative abundance of several of Alberta's small mammal species (Schowalter 2001).

## 2.0 METHODS

Seven sites were selected from the Alberta Conservation Association Abandoned Farmstead program. Landowner permission for the perspective sites was gained prior to the survey. Two field technicians equipped with proper safety gear searched all old buildings and sheds in each site for owl pellets. Each technician was equipped with an AO 5 Star Respirator, which had R51HE-P100 filter cartridges that filtered 99.97% of contaminates (i.e. hanta virus). Latex gloves were used for handling the pellets, which were placed in brown paper bags. Time of the collection, location, collector, and date were all written on the paper bags, which were then placed in zip lock bags to be frozen. The pellets were sent to Edmonton where proper sterilizing facilities exist to dissect owl pellets. Schowalter (2000) describes the proper sterilization techniques for dissecting and handling of owl pellets.

Owl pellet material was wrapped in aluminum foil so that they could be sterilized with a high temperature autoclave. The foil wrap was labeled with the site number associated with it. After being autoclaved, the pellets were teased apart using fingers and tweezers. Bones were sorted from other material in the pellets and were put in separate containers.

Remains found in the pellets were compared to collections from the Provincial Museum of Alberta. A dissecting microscope was used to aid in the identification of tooth patterns for mice and voles. Museum staff was also available for aid in identification of specimen. The methods used to identify and count specimen in this study were adopted from those used in Schowalter (2001).

Particular effort was made to identify mammal species. Species classification for mammals was derived from Mammals of North America, Temperate and Arctic Regions (Forsyth 1999). All mammalian species were classified down to the lowest identifiable Taxa. Species were only confirmed if a clear characteristic from one or more bone remains indicated that the species was present.

Identified remains were divided by species and placed in separate canisters from other remains. All counts, collection, examination, and location information was recorded for each site on a data sheet. Remains from sites were kept separate from one another. Voucher specimens were stored at the provincial museum of Alberta.

All species counts were recorded on datasheets and a separate datasheet was used for each collection site (Appendix C). Once counted and recorded, each species was placed into canisters and labeled. Excess bones were also placed into canisters and labeled. All pellet material was packed together as a site.

## 3.0 RESULTS

### 3.1 Mice (*Muridae*)

Northern grasshopper mice (*Onychomys leucogaster*) were found in each of the seven sites, deer mice (*Peromyscus maniculatus*) were found at five sites, house mice (*Mus musculus*) were found at three sites and the remains of an olive-backed pocket mouse (*Perognathus fasciatus*) were found at one site. Although northern grasshopper mice were recovered in each of the seven sites, deer mice were the most abundant species; outnumbering northern grasshopper mice at the five sites they were found (Table 2.5).

### 3.2 Voles (*Arvicolinae*)

Both meadow (*Microtus pennsylvanicus*) and sagebrush voles (*Lemmiscus curtatus*) were found at five sites and the remains of a southern red-backed vole (*Clethrionomys gapperi*) were found at one site. Sagebrush voles were the more abundant species, outnumbering meadow voles at three of the five sites. Twenty-one vole specimens from two sites could not be identified due to their poor condition; as a result, they were labeled as unknown (Table 2.5).

### 3.3 Other Remains

Besides bone remains from mice and voles, remains from ground squirrels, rabbits, birds, amphibians and insects were also found. Richardson's Ground Squirrels (*Spermophilus richardsonii*) remains were found in three sites, *Leporidae* remains were found in two sites, *Aves* remains were found in six sites and the remains of a salamander, likely a tiger salamander (*Ambystoma tigrinum*) was found in one site. Insect remains were found in five of the seven sites. Both *Coleoptera* and *Acrididae* were found in these five sites, whereas *Lepidoptera* was found in only one site (Table 2.5).

**Table 2.5:** Specimen counts from owl pellets.

| Specimen Taxa | Status | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Site 7 | Count |
|---|---|---|---|---|---|---|---|---|---|
| *P. maniculatus* | Secure | 16 | 6 | 42 | 9 | 27 | | | 100 |
| *O. leucogaster* | Secure | 3 | 1 | 21 | 4 | 2 | 1 | 1 | 33 |
| *M. musculus* | Exotic/Alien | | | 2 | 1 | 2 | | | 5 |
| *P. fasciatus* | Sensitive | | | | | 1 | | | 1 |
| *M. pennsylvanicus* | Secure | 13 | 2 | 13 | 1 | 5 | | | 34 |
| *L. curtatus* | Secure | 6 | 10 | 51 | 12 | 1 | | | 80 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *C. gapperi* | Secure | | | 1 | | | | | 1 |
| *Arvicolinae* | N/A | | | 20 | 1 | | | | 21 |
| *S. richardsonii* | Secure | | 1 | 2 | 1 | | | | 4 |
| *Leporidae* | N/A | | | 1 | 1 | | 1 | | 3 |
| *Aves* | N/A | 1 | | 8 | 7 | 9 | 1 | 1 | 27 |
| *Caudata* | N/A | | 1 | 1 | | | | | 2 |
| *Coleoptera* | N/A | 1 | | 2 | 1 | 17 | 3 | 3 | 27 |
| *Acrididae* | N/A | | | 1 | 13 | 10 | 34 | 7 | 65 |
| *Lepidoptera* | N/A | | | 1 | | | | | 1 |

Site 3 had the largest number of the samples (232.5g) and, not surprisingly, represented the highest number of species. Sites 6 and 7, which are geographically very close to one another in comparison to other sites, both had a similar representation of species. Despite the fact that site 6 is a much larger sample than site 7 (there were 84g of material collected in site 6 as compared to 15g in site 7) (Table 2.6).

**Table 2.6:** General site information for owl pellet collections

| | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Site 7 | Count |
|---|---|---|---|---|---|---|---|---|
| **# of specimen** | 40 | 21 | 166 | 51 | 74 | 40 | 12 | 404 |
| **Total # of mammals** | 2 | 1 | 14 | 22 | 36 | 39 | 11 | 125 |
| **Weight (g) of material** | 57.5 | 22 | 232.5 | 57 | 78 | 84 | 15 | 546 |
| **Est. # of pellets** | 5 | 4 | 28 | 6 | 9 | 13 | 3 | 68 |

## 4.0 DISCUSSION

Given the number of locations and small sample size, it is difficult to determine the level of biodiversity of small mammals in the Milk River Basin. However, certain inferences can be made.

Grasshopper mice and sagebrush voles occurred in 100% and 71% of the collections, respectively, and may be a common species of the area. Sagebrush voles even outnumber the commonly occurring meadow voles and deer mice in the sites 2 and 3. This suggests a healthy population of sagebrush voles in that area.

The Olive-backed pocket mouse is restricted to the southern prairies of Alberta (Engley and Norton 2001). Smith (1993) suggests that the olive-backed pocket mouse is scarce in Alberta and this species is ranked as *Sensitive* in the General Status of Alberta Wild Species 2000 report. The species was detected at one site, indicating presence within the basin.

Southern red-backed voles are a common species in forested areas and occur both in Waterton Lakes National Park and Cypress Hills Provincial Park (Smith 1993). However, this species relies heavily on forested environments for food (Forsyth 1999) and is, understandably, absent from grassland records in Alberta (Smith 1993). Specific

habitat information for site 3 and further collections would be beneficial in attempting to determine if this species is present in the area or if a migratory owl deposited the pellet in the area after consuming the specimen elsewhere.

Western jumping mice (*Zapus princes*) and western harvest mice (*Reithrodontomys megalotis*) are expected to occur in the Milk River Basin (Smith 1993, Engley and Norton 2001) but are not represented in the pellets. Western jumping mice are typically very uncommon in pellet collections (Schowalter 2001) and lack of specimen may reflect an owl's inability to catch these rodents rather than an absence of this species in the region. The status of Western harvest mice is *Undetermined* according to the General Status of Alberta Wild Species 2000. Though numerous specimens have been recorded in the Suffield National Wildlife Area, this species has only occurred in 3 records outside of Suffield (Engley and Norton 2001).

## 5.0 FUTURE MANAGEMENT OBJECTIVES

- Further study is suggested in the locality of Site 5 in order to determine if healthy populations of olive-backed pocket mice thrive there.
- Further study is suggested in the locality of Site 3 in order to determine if healthy populations of southern red-backed voles thrive there.
- A more expansive collection of owl pellets should be collected both in number of sites and amount of material if possible.
- Specific site habitat and vegetation information should be captured during collection in order to aid in determining if an area is suitable for specific species.

## 6.0 LITERATURE CITED

Alberta Sustainable Resource Development, Fish and Wildlife Service. 2000. The General Status of Alberta Wild Species 2000. 46 pp.

Engley, L. and M. Norton. 2001. Distribution of selected small mammals in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Service, Alberta Species at Risk Report No. 12. Edmonton, AB. 75 pp.

Forsyth, Adrian. 1999. Mammals of North America: temperate and arctic regions. Firefly Books Ltd. 352 pp., illustrated.

Schowalter, D. 2001. Distribution and relative abundance of small mammals of the western plains of Alberta as determined from great horned owl pellets. Alberta Sustainable Resource Development, Fish and Wildlife Service, Alberta Species at Risk Report No. 17. Edmonton, AB. 28 pp.

Smith, Hugh C. 1993. Alberta Mammals: An Atlas and Guide. Provincial Museum of Alberta. 250 pp., illustrated.

## APPENDIX C- Milk River Basin Owl Pellet Identification Data Sheet

Site Number: Date Collected: UTM Coordinates:
Weight (g): Date Examined: ATS Location:

### Mammalia

| Species Code / Taxa | # of Ind. | Upper Jaw | | Lower Jaw | | Front Leg | | Rear Leg | | Notes/ Other features used to ID |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Right | Left | Right | Hum. | Ulna | Femure | Tibia | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

### Aves

| Species Code / Taxa | # of Ind. | Beak | | Wing | | | Leg | | | Notes/ Other features used to ID |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upper | Lower | Hum. | Ulna | CMC | Femure | Tibia | TMT | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

### Herptiles

| Species Code / Taxa | # of Ind. | Upper Jaw | | Lower Jaw | | Front Leg | | Rear Leg | | Notes/ Other features used to ID |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Right | Left | Right | Upper | Lower | Upper | Lower | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

## Insects

| Species Code / Taxa | # of Ind. | Head Capsules | Mandible | Wing Covers | Rear Leg (Romalia) | | Notes/ Other features used to ID |
|---|---|---|---|---|---|---|---|
| | | | | | Upper | Lower | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Notes-** *Other prey Items, Unknown items, comments on site specifics, etc.*

# Loggerhead Shrike Surveys: 2004

**Brad A. Downey**, Alberta Conservation Association, Lethbridge, AB

## 1.0 INTRODUCTION

Loggerhead shrikes (*Lanius ludovicianus excubitorides*) are a "Species of Special Concern" in Alberta and "Threatened" in Canada (COSEWIC 2004, Fish and Wildlife Division 2004). The Milk River Basin was identified as the smaller of two key loggerhead shrike populations in Alberta (Smith 1991). Intensive surveys over the last 2 years have resulted in an increased number of sightings within the Milk River Basin. In 2002 surveys were conducted primarily by road transects which resulted in eleven sites containing shrikes (Downey 2003). In 2003 both roadside and quadrat surveys were conducted. The increased search effort resulted in seventeen new sites containing shrikes, however only two of these were the result of quadrat surveys (Figure 2.1). In 2004 it was decided that quadrat surveys were an ineffective survey method within the basin (Downey 2004). Surveys in 2004 were therefore concentrated along roadways and along a river route during a canoe trip using call playback. Canoe surveys enabled staff to focus on isolated habitat with high numbers of native shrubs, such as thorny buffaloberry. Habitat information collected in 2004 was combined with information from 2002 and 2003 in order to compare both non-native (farmyards) and native sites (no farmyards).

## 2.0 METHODS

### 2.1 Roadside Call Playback Surveys

Two observers, in a single vehicle, conducted roadside surveys; one followed a predetermined route driving between 50km/hr and 70km/hr while the second observer scanned the area for shrikes Surveys were started a 0700 hours and were completed by 1500 hours (Downey 2004). In areas of highly suitable habitat the observers would stop and play a loggerhead shrike call to entice the shrikes to become more visible.

### 2.2 Canoe Call Playback Surveys

Canoe surveys were conducted along the mainstem of the Milk River. Two observers floated the river between June 21 and June 23, 2004. Call playback was used to entice a response from shrikes not visible from the river. The primary observer, in the front of the canoe, observed the shoreline and shrubs along the river for a response to the call (i.e. a shrike flying, perched on top of a shrub, or calling back). When a shrike was encountered the observers would pull the canoe over to the shore, and search the area for a nest. Shrub height, width, and species, number of young, nest height, and habitat within 200m were all recorded to compare nesting characteristics relative to shrikes found along roadways and farmyards. Minimal time was spent near the nest site to reduce disturbance.

## 3.0 RESULTS

Increased use of call playback in areas of suitable habitat resulted in the identification of 21 sites along roadways (Figure 2.1). Incidental sightings while driving to and from survey transects and while conducting other surveys also identified 6 shrikes (Figure 2.1). A three-day 30km canoe survey (June 21- 23, 2004) allowed the exploration of an area of the basin, which had not previously been surveyed. This survey resulted in 19 new loggerhead shrike nests locales being found. Along the long sinuous transect provided by the river channel, there was an average 0.63 shrikes/km. The sites were sometimes separated by as little as 400m (Figure 2.1). At these sites, 7 shrikes were detected in flight and 12 were detected perching. Twelve nests were confirmed and contained between 4 and 5 young ranging from 2 to 12 days old, one nest was also found containing 6 eggs. The height of nests average 5.4ft and all were located in single clumps or along the fringe of dense clumps of thorny buffaloberry shrubs. On average shrubs, were 8.8ft high and 4.5ft wide. Nests were not found at six of the sites where shrikes were active.

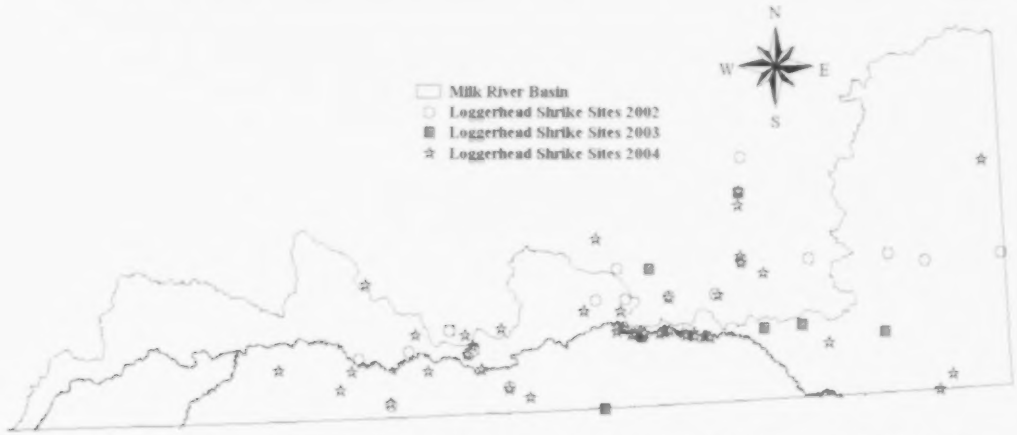



**Figure 2.1:** Loggerhead shrike occupied sites within and adjacent to the Milk River Basin, 2002-2004.

Forty-six sites were found within and adjacent to the Milk River Basin in 2004. They were combined with 23 additional sites found in 2002 and 2003 to determine habitat characteristics. Habitat percentages varied depending on the presence or absence of farmyards. Sites containing farmyards usually had an even distribution of habitat types, typical of edge habitat, with cultivation being dominant comprising 25.4% of the area (Table 2.7). Sites without farmyards focused on two major habitat types, native pasture and riparian, with riparian comprising 23.3% of the area used by shrikes (Table 2.7). Common caragana (*Caragana arborescens*) was the dominant shrub utilized in farmyards while thorny buffaloberry (*Shepherdia argentea*) and willow (*Salix*) were the dominant shrubs where no farmyards were present. When all sites were combined, native pasture (34.0%) was the dominant habitat type followed by cultivation (17.5%) and 14% riparian (Table 2.7).

**Table 2.7:** Loggerhead shrike main habitat characteristics based on 69 individual sites from 2002 - 2004.

| All Sites ($n$ = 69) | | Sites with Farmyards ($n$ = 32) | | Sites without farmyards ($n$ = 37) | |
|---|---|---|---|---|---|
| Native Pasture | 34.0% | Cultivation (dryland) | 25.4% | Native Pasture | 45.5% |
| Cultivation (dryland) | 17.5% | Native Pasture | 20.0% | Riparian | 23.3% |
| Riparian | 14.0% | Farmyard | 17.6% | Shrubs | 12.9% |
| Shrubs | 12.5% | Shrubs | 12.9% | Cultivation (dryland) | 11.5% |

## 4.0 DISCUSSION

Roadside surveys using call playback allowed the identification of eight sites that would have been missed with no call playback. Two of these sites were found west of highway #4 within the basin where previously no shrikes had been found. Bjorge and Prescott (1996) found that 42.6% of shrikes were missed during road transects without call playback. The increased use of call playbacks since 2002 within the Milk River Basin has enabled observers to identify loggerhead shrike sites, which have previously been undetected. Call playbacks are an effective and efficient means of surveying for loggerhead shrikes within the Milk River Basin. The call playback survey method used in the Milk River Basin is particularly effective due to the relative lack of shrubs in this area when compared to some other parts of the species range. In areas with high numbers of shrubs, this method becomes time consuming due to the large amount of potential habitat (Prescott 2003).

During canoe surveys call playbacks were easily conducted due to the slow travel pace. On several occasions shrikes were spotted >100m from their nest, landing on shrubs beside the canoe in response to the call. In some cases observers could watch the shrike fly back to its nest shrub upon termination of the call. Call playbacks were also effective at attracting other birds such as eastern kingbirds (*Tyrannus tyrannus*), brown thrashers (*Toxostoma rufum*), black-billed magpies (*Pica hudsonia*), and American kestrels (*Falco sparverius*), which are all found in similar habitat. Though kestrels tend to use similar habitat to shrikes these species were not observed within the same areas along the mainstem of the Milk River. This may be due to the documented aggressiveness of both species towards each other and spatial segregation (Bildstein and Grubb 1980, Chabot 1994).

Loggerhead shrikes continue to use a variety of different habitats within the basin. This species has been found using farmyards within cultivated areas, and in riparian zones adjacent to native pasture. The main constant feature is the amount of shrubbery available for nesting, which made up approximately 13% of the habitat.

Loggerhead shrikes can be found in high abundances along railroad corridors, especially abandon railroads, which are left alone for shrub development (Collister 1994). Major rivers such as the Milk River, which have wide valley bottoms, provide shrub development for species like thorny buffaloberry, that make excellent nesting habitat for shrikes. About half the shrikes observed in the Milk River Basin are using natural habitats such as riparian zones as opposed to man-made habitats (e.g. farmyards). Wershler (1987) identifies these riverine habitats containing thorny buffaloberry as fairly localized in Alberta. Air photos and HSI models should be used to identify these

localized areas elsewhere in Alberta and surveys should be conducted. The occurrence of 19 shrikes along a small portion of the river indicates that key habitat is missed during road transects and that the local shrike population in the Milk River Basin may be higher than expected. Canoe surveys along the Milk River could provide substantial information on shrike and other species populations previously unknown. These surveys allow exploration into areas that haven't been surveyed in the past due to limited road access.

## 5.0 MANAGEMENT RECOMMENDATIONS

- Identify areas along the Milk River with potential for shrike habitat using habitat suitability index models and air photo interpretation.
- Conduct canoe surveys along suitable reaches of the Milk River in order to confirm these unique habitats and identify new shrike sites.
- Continue to take habitat measurements and talk to local riparian authorities to determine riparian health scores that correspond with loggerhead shrike habitat.

## 6.0 LITERATURE CITED


Bildstein, K.L. and T.C. Grubb, Jr. 1980. Spatial distribution of American kestrels and loggerhead shrikes wintering sympatrically in eastern Texas. Raptor Research 14(3): 90-91.

Bjorge, R.R. and D.R.C. Prescott. 1996. Population estimate and habitat associations of the loggerhead shrike, Lanius ludovicianus, in southeastern Alberta. Canadian Field Naturalist 110 (3): 445- 449

Chabot, A.A. 1994. Habitat selection and reproduction biology of the loggerhead shrike in Eastern Ontario and Quebec. Unpublished M. Sc. Thesis. Macdonald Campus of McGill University. Montreal, Quebec. 161 pp.

Collister, D.M. 1994. Breeding ecology and habitat preservation of the loggerhead shrike (*Lanius ludovicianus*) in southeastern Alberta. Unpublished M. Sc. Thesis. University of Calgary, Calgary, Alberta. 161 pp.

COSEWIC. 2004. Canadian Species at Risk, May 2004. Committee on the Status of Endangered Wildlife in Canada. 49 pp.

Downey, B.A. 2003. Loggerhead shrike surveys of the Milk River Basin, Pages 85-92 *in* Quinlan R.W., B.A. Downey, B.N. Taylor, P.F. Jones, and T.B. Clayton (eds.). A multi-species conservation strategy for species at risk in the Milk River Bain; Year 1-progress report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 72, Edmonton, AB.

Downey, B.A. 2004. Loggerhead shrike surveys within the Milk River Basin. Pages 39-49 *in* Quinlan R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-Species Conservation Strategy For Species at Risk: Year 2- Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Fish and Wildlife Division. 2004. Report of Alberta's Endangered Species Conservation Committee: June 2002. Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, AB. 40 pp.

Prescott, D.R.C. 2003. The use of call playbacks for Censusing Loggerhead Shrikes in southern Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 67. Edmonton, Alberta. 10 pp.

Smith, W.W. 1991. The loggerhead shrike in Alberta. Pages 241-242 *in* Proceedings of the second prairie conservation and endangered species workshop. Edited by G.L. Holroyd, G. Burns, and H.C. Smith. Natural History Occasional Paper No.15, Provincial Museum of Alberta, Edmonton, Alberta.

Wershler, R.M. 1987. Loggerhead Shrike Survey of Southern Alberta. 1987. Unpublished report to the Canadian Wildlife Service. Alberta Fish and Wildlife, and World Wildlife Fund Canada. 16 pages.

# Long-tailed Weasel Survey

**Brandy L. Downey**, Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB

## 1.0 INTRODUCTION

The long-tailed weasel (*Mustela frenata*) is a May be at Risk species in Alberta (Alberta Sustainable Resource Development 2001). Despite this status there have been only a few studies on its distribution and population. Two of these studies involved interviews and questionnaires designed to identify target areas and develop future inventory protocols for the long-tailed weasel (Proulx and Drescher 1991, Scholwalter 2000). Though these surveys yielded some information on the long-tailed weasel, there has been no follow-up. Consequently there is little data for the species in Alberta. Through MULTISAR a standardized inventory protocol was designed in the winter of 2003 in order to better understand the range and habitat requirements of long-tailed weasel. A trial study was then conducted in 2004 as part of MULTISAR Project.

## 2.0 METHODS

Five sooted-track plate stations were set up along a 6 km transect for a 14-day period between April 1st and May 30th (Fowler and Golightly 1994). Four of these stations were designed for small mammals like the weasel and one was designed for larger species such as fox (*Vulpes spp*), badger (*Taxidea taxus*) and bobcat (*Lynx rufus*). Sites were selected based on the results of past questionnaire surveys (Proulx and Drescher 1991, Scholwalter 2000) and historical sightings found in the Alberta biodiversity/species observation database (BSOD). The sooted-track plates were installed approximately 1 km apart and at least 50 m from any roads or trails. The stations were given an identification number and the location was recorded using a GPS unit. A habitat evaluation form was completed at each station to assess the major habitat features, vegetative cover, and amount of human disturbance in the area.

Each sooted-track plate was sooted prior to field setup and a wooden cubby was built to house each set of plates (Downey 2004). At each station a cubby was placed on even ground facing north-south to avoid wind damage. One sooted-track plates was placed in each side of the cubby with the bait placed between. To avoid damage, the sooted-track plates and Con-tact paper were kept separate from the cubby until field setup. Chicken cat food was used as the bait (Fowler and Golightly 1994).

Stations were revisited every 3-5 days and checked for tracks. During each visit the weather, state of track plate, and number of tracks was recorded on a result form. Tracks were removed using clear wide tape and transferred to heavy white paper. The tracks were then taken back to the office for analysis. Although the long-tailed weasel is the targeted species in this survey all tracks on the contact paper were recorded and saved.

## 3.0 RESULTS

The sooted-track plate method yielded no results for long-tailed weasel or other target species in 2004. The stations were heavily used by mice, which severely cluttered up the soot-plate and used up the bait rapidly. Tracks from the mice were too small to distinguish species and are therefore not useful for further analysis. A few of the stations leaked during wet weather, which made any tracks left indistinguishable. Large mammals moved stations around, tried to steal bait and used the stations as scent markers. One station along each transect was designed for larger mammals however these stations were not used.

Though there were no results from the soot-track stations there were three sighting of long-tailed weasels in the Milk River Basin in 2004. All three occurred in the last two weeks of June along highway 501. Two of these sites were in areas of 100% cultivation. The third sighting was in primarily native habitat along the edge of a creek. Due to the few sighting of long-tailed weasels in the basin no analysis was conducted.

## 4.0 DISCUSSION

Several successful surveys have been conducted using this method in forested areas (Fowler and Golightly 1994). There is little information on this method being used on the prairie and this change in environments may have contributed to the problems that were experienced with the survey design. The location of stations, effects of large and small mammal damage, timing of the survey, and size of study area may also have contributed to the lack of detections. These factors were examined and several recommendations made.

The majority of stations were damaged by higher than expected large and non-target species use. Several plates were moved around, bait was stolen, plates cluttered by unidentifiable species and some were used as scent markers. All of this would discourage use by smaller predators such as the long-tailed weasel. It is recommended that stations be placed at sites with some protection from larger mammals, such as near shrubs, fence posts, or trees. Trees and fence posts would help hold stations in place incase a large mammal was attracted to it. In cases where this is not possible then stations should be secured to the ground using rebar stakes on both sides. An additional amendment could include the placement of camera-trapping stations. The camera-trapping surveys would be set up according to the protocol described in Zielinski and Kucrea (1995). These would aid in the identification of small and large mammals that cannot be detected by the track plates; as well they would increase the chance of detecting the target species. The camera stations would also allow data to be collected despite damage to plates.

Survey timing may have also contributed to the lack of detections. Several previous studies have shown that the highest number of detections occurred in the late winter to early spring (Fowler and Golightly 1994, Zielinski and Kucrea 1995, Zielinski 2000).

The main reason attributed to this was a lack of food making the baited stations more attractive to the animals. The time frame for sampling was altered to the spring to accommodate MULTISAR staff time, however this may have adversely affected the study by decreasing the attractiveness of the stations to the species. Due to this a second trial period will be run between January and April of 2006 to determine which months would be the most suitable for surveying.

Past questionnaire surveys in Alberta indicate a small population of long-tailed weasels in the Milk River Basin (Proulx and Descher 1991). This, coupled with the relatively large size of the basin and small home range of the weasel, may have greatly decreased the chance of detection. Therefore a basin wide study may be too large a scope for this survey method and species. Future sooted-track plate studies will be limited to MULTISAR stewards lands; Stewardship areas are the result of Multi-species Conservation Values (MCV), which ranked land in the Milk River Basin on importance for multiple species of wildlife (Jones and Downey 2004). By concentrating efforts on steward's lands the density of stations will be increased in areas of high priority.

## 5.0 FUTURE MANAGEMENT OBJECTIVES

- Conduct a second trial run from January-April 1, 2006
- Include camera-trapping stations during surveys to increase detection of all species.
- Limit study area to MULTISAR stewards' lands.
- Continue habitat data collection for individuals detected during the surveys and incidental sightings within the basin.

## 6.0 LITERATURE CITED

Alberta Sustainable Resource Development. 2001. The General Status of Alberta Wildlife Species 2000. Alberta Sustainable Resource Development, Fish and Wildlife Service, Edmonton, AB, 46 pp. Publication No. I/023.

Downey, B.L. 2004. Long-tailed Weasel Survey Protocol, pages 74-87 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Jones, P.F. and B.L. Downey. 2004. Multi-species Conservation Value, pages 102-107 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Fowler, C.H. and R.T. Golightly. 1994. Fisher and marten survey techniques on the Tahoe National Forest. Final Report. Cal. Dept. Fish and Game, nongame bird and mammal Sec., Rep.94-9. Sacramento, CA. 64 pp.

Proulx, G. and R. Drescher.1991. Distribution of the long-tailed weasel (*Mustela frenata longicauda*) in Alberta as determined by questionnaires and interviews. Alberta Research Council, Wildlife Section, Forestry Department. 8 pp.

Showalter, T. 2000. An interview survey for the long-tailed weasel and other wildlife in Southern Alberta. Prepared for Alberta Conservation Association. 18 pp.

Zielinski, W.J. and T.E. Kucrea.1995 General Technical Report: American Marten, Fisher, Lynx and Wolverine Survey Method for their Detection. USDA Forest Service General Technical Report PSW GTR-157. Chapter 3-4.

Zielinski, W.J. 2000. Activity Patterns in Small Mammals: Weasels and Martens Carnivores in Northern Latitudes. Springer-Verlag, Berlin Heildberg. Ecological studies 141: 96-116.

# Results of Fish Refugia Surveys Completed in 2004

**Terry B. Clayton**, Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB
and
**Brad A. Downey**, Alberta Conservation Association, Lethbridge, AB

## 1.0 INTRODUCTION

Aquatic refugia, defined as isolated pools that persist during periods of drought or low flows, are important areas for a variety of aquatic life forms. The Milk River Basin experienced drought conditions from 1999 to June 2002, which was prior to the sampling period. Sampling in the fall of 2002 and 2003 on Milk River tributaries therefore focused on identifying potential refugia sites and collecting data on water depths. In 2004 we placed greater emphasis on collecting habitat and abiotic data on specific creeks. A partial Phase II inventory, which looks at fish habitat, (Fisheries Branch 1985) was conducted on five Milk River tributaries in the west and central parts of the basin: Kennedy Creek, Van Cleve Creek, Breed Creek, Shanks Creek, and two along Red Creek. Sites that were suspected as fish refugia in 2003 were revisited and photographed. We expected differences in water levels due to the variation in precipitation over the past three years with pools constituting refugia remaining at relative stable water levels.

## 2.0 METHODS

A 1000 m section in each of five major tributaries to the Milk River was selected for sampling; an additional 1000 m section of Red Creek was also surveyed. Water quality parameters taken included dissolved oxygen (mg/L) and temperature ($C^{o}$) using a DO 200 YSI meter. Conductivity (microsiemens/cm) was measured using a HACH conductivity meter. Wetted and rooted widths, meaning the width of the pool if it was full, were determined with a 50m tape, while the depth of pools and water clarity were measured with a graduated rope and secchi disc. Percentage refugia along the 1000 m stretch was calculated by dividing the total length of all pools $\geq$0.75 m by the 1000 m transect. Fish were collected using dip nets and preserved using alcohol; samples were returned to Alberta Fish and Wildlife in Lethbridge for identification. Red, Breed, Shanks, and Van Cleeve creeks were surveyed in mid-August, while Kennedy Creek was surveyed at the end of October.

## 3.0 RESULTS

The average values for data collected on the surveys are summarized in Table 2.8. . All of the sections of creeks surveyed had some pools over 1.0 m in depth. Mean pool depth ranged from 0.9 m in Breed Creek to 1.7 m in Van Cleeve Creek. The percentage of potential refugia ranged from a low of 1% in Shanks Creek to a high of 65% in Kennedy Creek. The high percentage of habitat deeper than 1 m in Kennedy Creek was due to two beaver dams impounding the stream. Upstream of the dams there was a ledge in the creek bed, resulting in a drop of approximately 0.8 m. Conductivity values ranges from 1300

microsiemens/cm (µS/cm) in Breed Creek to 4500 µS/cm in Van Cleeve Creek. Dissolved oxygen concentrations were above 8 mg/l in all creeks but Shanks Ck.; the concentration in Shanks Ck. was 5.4 mg/l.

**Table 2.8:** Average of all measurements taken for each tributary measured in the Milk River Basin in 2004.

| Tributary | Water Temp. (°C) | Turbidity (m) | Conductivity (µS/cm) | Dissolved $O_2$ (mg/L) | Avg. Pool Depth (m) | % Fish Refugia (≥ 0.75m ) |
|---|---|---|---|---|---|---|
| Van Cleeve | 17.9 | 0.85 | 4500 | 10.10 | 1.68 | 12 |
| Breed | 17.3 | 0.76 | 1300 | 8.10 | 0.88 | 10 |
| Red (Upper Section) | 20.1 | 1.00 | 2400 | 12.05 | 1.18 | 20 |
| Red (Lower Section) | 18.1 | 1.38 | 2800 | 13.36 | 1.38 | 25 |
| Shanks | 16.0 | 0.40 | 1800 | 5.40 | 1.20 | 1 |
| Kennedy Creek | 4.0 | 0.5 (below drop) | 1900 | 9.86 | 1.67 | 65 |
| | | 1.5 (above drop) | 2400 | 13.00 | | |

Fish were collected in four of the five creeks surveyed (Table 2.9); fish collections were not attempted in Kennedy Creek due to difficulties in obtaining a permit. Five species were captured in Van Cleeve Creek, including fathead minnow (*Pimephales promelas*), brook stickleback (*Culaea inconstans*), white sucker (*Catostomus commersoni*), lake chub (*Couesius plumbeus*), and longnose dace (*Rhinichthys cataractae*).

**Table 2.9:** Species of fish caught in each tributary in 2004.

| Tributary | Fish Species Collected |
|---|---|
| Van Cleeve | fathead minnow, brook stickleback, white sucker, lake chub, longnose dace |
| Breed | brook stickleback, lake chub, northern redbelly dace |
| Red (Upper Section) | northern redbelly dace, fathead minnow, brassy minnow |
| Red (Lower Section) | longnose dace, fathead minnow |
| Shanks | fathead minnow |
| Kennedy Creek | no fish collected |

Brook stickleback, lake chub, and northern redbelly dace (*Chrosomus eos*) were netted in Breed Creek. Iowa darter (*Etheostoma exile*), longnose dace, white sucker and longnose sucker (*Catostomus catostomus*) have been captured previously in Breed Creek.

Fathead minnow, northern redbelly dace, longnose dace, and brassy minnow (*Hybognathus hankinsoni*) were taken in Red Creek. Other species recorded as being present in Red Creek are brook stickleback, lake chub, longnose sucker, white sucker, and yellow perch (*Perca flavescens*).

Fathead minnow was the only fish species collected in Shanks Creek in August 2004. Previous studies indicated that lake chub and white sucker also occur in this creek.

Other species of interest that were observed included northern leopard frogs (*Rana pipiens*) and plains garter snakes (*Thamnophis radix*) along Red Creek, and plains garter snakes and wandering garter snake (*Thamnophis elegans*) along the Van Cleeve Creek.

## 4.0 DISCUSSION

Photographs taken in 2004 showed how water levels at some suspected refugia had fluctuated over the years, while they remained fairly constant at other locations (Appendix D). Rainfall was variable over the three years, with 2002 being an extremely wet year (513.4 mm of precipitation), 2003 being dry (197.3 mm of precipitation), and 2004 being normal (276.8 mm of precipitation), based on precipitation data recorded for Milk River, Alberta (The Weather Network 2004). The Dry Mixedgrass Subregion, which encompasses most of the Milk River Basin, usually has annual precipitation amounts between 260-280 mm (Achuff 1994).

The conductivity values were substantially higher in the five creeks surveyed in 2004, in comparison to data collected previously from the mainstem Milk River. Values for the mainstem below the Town of Milk River measured in August 2000 ranged from 130 to 170 µS/cm (RL&L 2002). During March 2002, when portions of the lower Milk River were predominately a series of pools, specific conductance ranged from 910 to 1750 µS/cm (RL&L 2002). Ostrand and Wilde (2004) observed that for isolated pools in the upper Brazos River in north Texas, conductivity increased while turbidity and volume decreased, as water evaporated. They observed a decrease in plains minnow (*Hybognathus placitus*) presence and abundance as isolated pools shrunk in size. The brassy minnow is in the same genus as plains minnow so similar effects could be seen with decreasing pool size.

The dissolved oxygen and temperature values collected in August 2004 were all well over the critical oxygen minimum and under the critical maximum temperatures reported for fathead minnow and white sucker in Missouri prairie streams (Smale and Rabeni 1995). However, the environmental conditions were much more severe in 2001 during a drought, than they were in 2004 (average precipitation).

Few potential fish refugia sites were found in Shanks Creek and of the few areas thought to offer refugia, all had comparatively lower dissolved oxygen and high turbidity compared with the other surveyed streams. Red and Kennedy creeks both contained several clear, deep pools with higher dissolved oxygen; two of the Kennedy Creek pools were the result of beaver dams. High quality fish refugia ponds were also found in Van Cleve Creek, which was not initially expected. Based on historical and local knowledge Van Cleve was not considered to have potential fish refugia sites, and thus was not surveyed in 2002 or 2003 (Clayton 2003). However, during a snake study near the end of 2003, a sizeable pond was found, so the creek was included in the current survey. This demonstrates the value of using a multi-disciplinary approach to surveys on the landscape (i.e., MULTISAR).

In 2004, additional stream lengths were surveyed, and potential fish refugia sites were examined in greater detail, compared to past survey years. Specific sites identified as potential refugia in 2002 were photographed again in 2004. However, the ideal conditions that will determine which sites are refugia will occur in the second and third years of

drought conditions, which have not occurred in the Milk River Basin since this project began.

## 5.0 LITERATURE CITED


Achuff, P.L. 1994. Natural regions, subregions and natural history themes of Alberta: a classification for protected areas management (revised December 1994). Prepared for Alberta Environmental Protection, Parks Services. 72 pp.

Clayton, T.B. 2003. Milk River Basin Tributaries Project. Pages 22-37 in Quinlan, R.W., B.A. Downey, B.N. Taylor, P.F. Jones, and T.B. Clayton (eds.). A multi-species conservation strategy for species at risk in the Milk River Basin: Year 1- progress report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 72, Edmonton, Alberta.

Fisheries Branch. 1985. Manual of fisheries inventory methods. Department of Energy and Natural Resources, Fish and Wildlife Division, Edmonton, AB.

Ostrand, K.G. and G.R. Wilde. 2004. Changes in prairie stream fish assemblages restricted to isolated streambed pools. Transactions of the American Fisheries Society 133: 1329-1338.

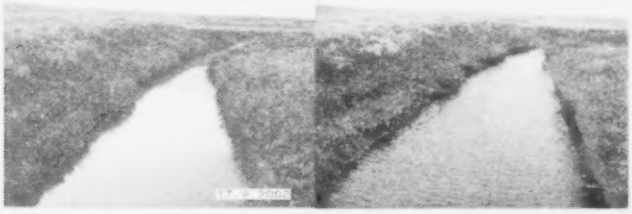
RL&L Environmental Services Ltd. 2002. Fish species at risk in the Milk and St. Mary drainages. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 45. Edmonton, AB.

Smale, M.A. and C.F. Rabeni. 1995. Hypoxia and hyperthermia on fish species composition in headwater streams. Transactions of the American Fisheries Society 124: 698-710.

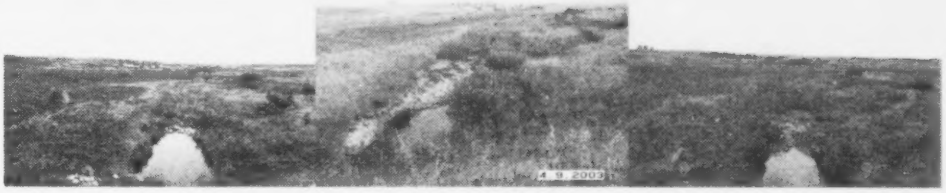
The Weather Network. 2004. Historical Data. http://209.82.48.85/climate/historical.asp Retrieved November 29, 2004.

## APPENDIX D- Fish Refugia Site Photographs

Bare Creek (2002, 2004)



Bear Creek (2002, 2003, 2004)

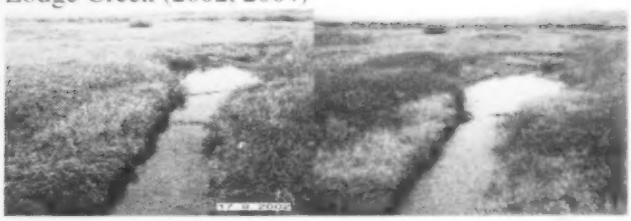


Breed Creek (2002, 2004)

Breed Creek (2002, 2003, 2004)

Kennedy Creek (2004)

Lodge Creek (2002, 2004)



Red Creek (2002, 2003, 2004)

Red Creek (2002, 2003, 2004)

Shanks Creek (2002, 2003, 2004)

Van Cleeve (2004)

# CHAPTER 3

# STEWARDSHIP

# MULTISAR Stewardship Program

**Brandy L. Downey[1], Richard W. Quinlan[1], Brad A. Downey[2] and Paul F. Jones[2]**
1-Alberta Sustainable Resource Development, Fish and Wildlife Division, Lethbridge, AB
2-Alberta Conservation Association, Southern Business Unit, Lethbridge, AB

## 1.0 INTRODUCTION

The term stewardship is commonly used in association with environmental management. The Oxford Dictionary defines stewardship as "a person entrusted with the management of another's property". The Alberta Department of Sustainable Resource Development Fish and Wildlife Division (2005) defines it as "involves the wide range of voluntary actions that people take to conserve and protect the environment". The Canadian Wildlife Service (2005) defines it as "referring to the wide range of voluntary actions that Canadians take to care for the environment. Activities range from monitoring and conserving wildlife species and their habitat, to protecting and improving the quality of soil, water, air, and other natural resources". For the purposes of MULTISAR, stewardship is actions by residents, conservation groups, industries, and government to provide appropriate land and resource management for the conservation of wildlife (including species at risk) and the natural landscape. The MULTISAR stewardship program is achieved through:

- Development of Habitat Conservation Strategies to maintain wildlife habitat on private and public land.
- Protection of wildlife habitat and landowner interests through the development of Conservation Agreements.
- Implementation of Habitat Conservation Strategies by providing financial assistance to landowners to complete recommendations.
- Production of educational materials that assist landowners, lessees, and industrial users to manage their lands compatibly for wildlife (including species at risk).

## 2.0 MULTISAR STEWARDSHIP GOALS

To effectively deliver the MULTISAR Stewardship program, goals were set to be delivered over a three-year period. The Goals are:

1. Complete Habitat Conservation Strategies and Conservation Agreements for 15% of the land base within the Milk River Basin, and some adjacent landscapes (Milk River Ridge, Pakowki Basin, St. Mary's Basin) by March 31, 2008.
    a. Develop Habitat Conservation Strategies with a minimum 4 landowners.
    b. Implementation of the Habitat Conservation Strategies will be completed on 80% of these lands.
    c. Conservation Agreements will be signed with all cooperating landowners.
2. Create a MULTISAR working group involving several local ranches to promote the MULTISAR stewardship approach by September 30, 2006.
3. Establish 2 demonstration sites by September 1, 2006.
4. Provide information/outreach to the ranching community within the basin.

a. Distribute 1000 program brochures by March 31, 2008.
b. Distribute 500 wildlife identification brochures by March 31, 2008.
c. Develop a Landowner Beneficial Management Practices guide by March 31, 2006.
d. Distribute 100 Beneficial Management Practices guides by March 31, 2008.

5. Create awareness of species at risk and MULTISAR through personal contacts with 50% of the project area rural residents by March 31, 2008.

## 3.0 STEWARDSHIP STEPS

### 3.1 Selection Criteria

To successful complete all of the MULTISAR stewardship program goals Habitat Conservation Strategies need to be implemented on approximately 255,000 acres of land within the Milk River Basin. A selection process was designed in 2004 using a Multi-Species Conservation Value (MCV) that incorporated 17 Habitat Suitability Index models (HSI) for priority species. The MCV selected areas within the basin best suited to multiple management species. This model is effective in targeting areas of currently high suitability that need to have specific management for species at risk. However this model only selects areas that are currently in a state of high suitability and does not take into account habitat corridors, designation of critical habitat by recovery teams, or areas in need of improvement/rehabilitation. Therefore selection criteria has been broadened to include:

1. High priority land selected through the Multi-species Conservation Value (Jones and Downey 2004)
2. High potential to link areas between stewardship initiatives and protected areas.
3. Direct protection of Critical Habitat as defined by recovery teams.
4. High value as a demonstration /educational site.
5. Opportunity for rehabilitation or improvement of a site.
6. Close proximity to a high MCV area.
7. High value for individual species at risk.

These criteria will be used to prioritize the landscape and direct efforts of field staff to secure participation of additional landowners. Also, some direct requests have been made to the MULTISAR team to implement recovery actions identified in provincial and national recovery plans. The MULTISAR program for 2005-2006 will include some recovery actions for western blue flag, western silvery minnow, St. Mary sculpin, stonecat, soapweed, yucca moth, and western spiderwort within the project area.

### 3.2 Working with Landowners

Landowners in areas that meet one or more of the selection criteria will be approached by MULTISAR staff to implement the stewardship program on their ranch. Alternatively landowners may directly approach MULTISAR team members to request a MULTISAR program on their land. This will lead to their land being evaluated to determine if it is

suitable for the MULTISAR approach. Steps in the MULTISAR stewardship program are listed below.

1. MULTISAR staff or a landowner initiates initial discussions. A preliminary meeting may be held to discuss suitability of the area for MULTISAR stewardship.
2. A meeting is held between the landowner, a range consultant, Alberta Fish and Wildlife Division (AFWD), Alberta Conservation Association (ACA) and Alberta Public Lands Division (PLD) if crown land comprises all or part of the ranch. This initial meeting allows for information exchange regarding history of the ranch, grazing systems used, and wildlife species known to occur on the land. A ranch tour is arranged, often concurrent with this first meeting. At this time the rancher is also encouraged to suggest any improvements he/she may be interested in.
3. The range consultant assesses the overall habitat health on the ranch and identifies possible improvements that could be made.
4. Wildlife assessments and monitoring surveys are conducted by MULTISAR staff.
5. During the first project meeting a team is formed involving ACA, AFWD, PLD, the landowner and possibly other cooperators. The purpose of this team is to exchange information as it is collected and assessed so that all parties are aware of the findings and possible direction the habitat conservation strategy will take.
6. The range consultants will complete the final report write up and provide copies to each of the team members.
7. A MULTISAR Conservation Agreement will be signed between the cooperating landowner, ACA, and Alberta Sustainable Resource Development (AFWD and PLD). This Conservation Agreement is being designed to be compliant with the federal Species at Risk Act (SARA) and Alberta's Wildlife Act in order to provide adequate protection for species at risk. Through mutual agreements with the landowner the Conservation Agreement will also be designed to formally recognize that the landowner is managing species at risk in an appropriate manner
8. The range consultants and MULTISAR staff prioritize a list of improvements and conservation actions in the Habitat Conservation Strategy after discussion with the team.
9. Negotiations will occur between the Landowner, ACA, PLD and AFWD on the implementation of specific conservation recommendations.
10. Implementation of the recommendations may be worked on over several years depending on the number of recommendations and available funds. Examples of conservation actions/improvements include: changes to range management practices, implementation of riparian improvement measures, re-establishment of native grasslands, changes to fencing, water developments, gates, and implementation of recovery actions developed by recovery teams.
11. Wildlife population and habitat monitoring will occur at intervals specified in the individual ranch habitat conservation strategies.

## 4.0 COMMUNICATION PROGRAM

Implementation of the MULTISAR Stewardship program relies heavily on communication between biologists, range specialists, landowners, communities, conservation groups and industry. The MULTISAR Communication Plan provides a strategy for communicating with different stakeholders. Methods include information brochures, website, presentations, annual reporting, team meetings, stakeholder meetings and one on one communication.

To date over 400 brochures have been distributed to conservation groups, landowners and government agencies (Table 3.1). Staff have spoken to 42 landowners about species inventories and the project in general. Thirteen presentations have been made to approximately 450 individuals (Table 3.1).

**Table 3.1:** MULTISAR presentations and brochure distribution.

| Audience/Recipient | Presentation Date | Number in Attendance | # of Brochures |
|---|---|---|---|
| Alberta Fish and Wildlife General Meeting | 9-Oct-03 | 50 | 0 |
| Alberta Fish and Wildlife staff (Medicine Hat) | 20-Jan-04 | 12 | 0 |
| Milk River Fish Recovery team and Municipalities | 25-Mar-04 | 20 | 0 |
| Southeast SRD Region General Meeting | 7-Apr-04 | 50 | 0 |
| Sustainable Resource Development (SRD) Executive Committee | 28-Sep-04 | 25 | 25 |
| The Grassland Conservation Working Group | 23-Jan-04 | 10 | 0 |
| The Prairie Conservation and Endangered Species Conference | 27-02-04 | 120* | 60 |
| Agriculture Fieldsman (County offices) | No presentation | n/a | 40 |
| Alberta Conservation Association | No presentation | n/a | 40 |
| Alberta Fish and Wildlife Division | No presentation | n/a | 40 |
| Alberta Provincial Parks | No presentation | n/a | 40 |
| Alberta Public Lands | 08-Mar-04 | n/a | 20 |
| Alberta SRD Legal Services Division | 1-Apr-04 | 3 | 0 |
| Calgary Zoo Endangered Species Team | 28-Jan-04 | n/a | 15 |
| Community offices with the Basin | No presentation | n/a | 20 |
| Government of Canada Habitat Stewardship Program | 3-Mar-03 | n/a | 20 |
| MULTISAR Landowner Kickoff Meeting | 22-Jul-04 | 8 | 10 |
| OGC Meetings - Milk River and Vauxhall | 3&4-12-03 | 25 | 65 |
| Private Landowners | No presentation | n/a | 180 |
| Southeast Region SRD Executive Caucus | 16-Jan-04 | 15 | 10 |
| Western Stock Growers Association | 7-Jul-04 | 100 | 15 |

* 3 separate presentations were made to approximately 120 people during the conference

A website that describes the goals, initiatives and achievements of the project and stewardship program was developed in 2004 (www.multisar-milkriverbasin.com). It is designed to inform landowners about the stewardship program and to facilitate additional communication between project staff and the public.

## 5.0 2004 UPDATE

In 2004 the first voluntary MULTISAR stewardship program was initiated on 61,280 acres of high MCV land. Habitat inventories have been completed for approximately 30,000 acres, comprising half of the area, with the other half scheduled for 2005. The initial goal was to have all inventories completed in 2004, however the large size of the ranch forced the range portion of the inventory to be completed over a 2-year period. Wildlife inventories were conducted throughout the ranch, and will be continued in 2005. Several of the MULTISAR focal species were detected during the summer of 2004 including burrowing owl (*Athene cunicularia hypugea*), long-billed curlew (*Numenius americanus*), loggerhead shrike (*Lanius ludovicanus excubitorides*), prairie falcon (*Flaco mexicanus*), ferruginous hawk (*Buteo regalis*), Sprague's pipit (*Anthus spragueii*), sharp-tailed grouse (*Tymphanuchus phasianellus*) and a prairie rattlesnake (*Crotalus viridis viridis*) hibernacula.

A habitat conservation strategy will be completed for the first cooperating ranch in 2006. It will include management objectives for each identified habitat unit (a habitat unit is usually a pasture). The objectives will be designed by the MULTISAR Habitat Conservation Strategy Team, which includes the landowner/lessee, Alberta Public Lands Division, Alberta Fish and Wildlife Division, Alberta Conservation Association and the range consultants. The MULTISAR Habitat Conservation Strategy Team began meeting in 2004 to develop management objectives for several habitat units. The MULTISAR Habitat Conservation Strategy will be the foundation for a Conservation Agreement that will be signed by the participants. The format and content of the Conservation Agreement is currently being drafted, and will be subject to agreement by the landowner..

## 6.0 MULTISAR PROGRAM EXTENSIONS

### 6.1 Recovery Teams

The success of MULTISAR has led several species recovery teams to request that their action plans be delivered through MULTISAR. These include actions for soapweed (*Yucca glauca*)/yucca moth (*Tegeticula yuccasella*), western silvery minnow (*Hybognathus argyritis*), western spiderwort (*Tradescantia occidentalis*), stonecat (*Notorus flavus*), St. Mary's sculpin (*Cottus spp)* and western blue flag *(Iris missouriensis).* These requests are being received by the MULTISAR project managers and will be considered on a case-by-case basis. For the upcoming year it is anticipated that activities related to western silvery minnow (already a priority species in MULTISAR), western blue flag (a scaled back ongoing project to be "rolled into" MULTISAR), as well as new initiatives for the mutually associated soapweed and yucca moth will be incorporated into MULTISAR. This new role of MULTISAR will be assessed at the end of 2005-2006 to evaluate the programs ability to deliver these species recovery action plans.

### 6.2 Industrial Guidelines

MULTISAR was initiated to provide landowners, government agencies and conservation groups the tools required to effectively conserve multiple species at risk at the landscape level. Though most project initiatives are still confined to, or near, the Milk River Basin, several of the tools and components developed for the project are being applied in other parts of Alberta (Quinlan et al. 2003). The Habitat Suitability Index (HSI) models identify key areas for 17 selected management species. The original use of the HSI models was to help prioritize areas for MULTISAR stewardship programs and wildlife inventories; Alberta Sustainable Resource Development (SRD) has expanded the models to the Grassland Natural Area. SRD will use them throughout their SE Region to help identify areas for recommendation of predevelopment surveys during landuse referrals. Prior to the use of these models landuse referral decisions were based primarily on historical sightings of wildlife, and if an area had not been surveyed in the past then no species would be flagged for predevelopment surveys. Applying the HSI models to landuse referrals identifies key areas for species despite the lack of inventories. The SRD Resource Information Services has already expanded 7 of the 17 HSI models developed for MULTISAR to the entire area of the Grassland Natural Region of Alberta, and several others are in preparation.

### 6.3 Beneficial Management Practices Working Group

Various wildlife species require different habitat types and structure for their life history requirements. Range management is a key tool in managing grassland habitat. The MULTISAR Beneficial Management Practices explain the various grazing systems available, summarize which systems benefit which species and provide some information on how industrial developments impact the selected management species. The MULTISAR BMPs are a key resource in a new current federal-provincial initiative to prepare BMPs for species at risk in the Prairie Provinces.

## 7.0 MULTISAR GOALS FOR 2005-2006

- Complete the first cooperative MULTISAR stewardship conservation plan.
- Develop a conservation agreement that is compliant with the Alberta Wildlife Act and the federal Species at Risk Act (SARA).
- Initiate stewardship programs on 1-2 additional cooperating ranches.
- Develop wildlife monitoring programs for the 1-2 cooperating ranches.
- Continue monitoring wildlife routes on current stewardship lands.
- Include recovery team action plans as deliverables through MULTISAR for the soapweed/yucca moth, western silvery minnow, western spiderwort, stonecat and St. Mary's sculpin.
- Continue educating the public on the positive effects of maintaining habitat for wildlife on their land.
- Obtain participation of several additional landowners for 2006-2007 stewardship projects in high priority areas.
- Develop a landowner friendly version of the Beneficial Management Practices (RCS 2004).

## 8.0 LITERATURE CITED


Alberta Fish and Wildlife Division. 2005. Prevention Strategies. http://www3.gov.ab.ca/srd/fw/speciesatrisk/prevention.html#1. Accessed February 9, 2005.

Canadian Wildlife Services. 2005. Habitat and Stewardship. http://www.cws scf.ec.gc.ca/theme.cfm?lang=e&category=5. Accessed February 9, 2005.

Downey, B.L, B.A. Downey, R.W. Quinlan and P.F. Jones. 2004. MULTISAR Stewardship Program, pages 108-111 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Habitat Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Jones, P.F. and B.L. Downey. 2004. Multi-species Conservation Value, pages 102-107 *In* Quinlan, R.W., B.A. Downey, B.L. Downey and P.F. Jones. 2004. MULTISAR: The Milk River Basin Project, A Multi-species Conservation Strategy for Species at Risk: Year 2 Progress Report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 87, Edmonton, AB.

Quinlan, R.W., B.A. Downey, B.N. Taylor, P.F. Jones and T.B. Clayton (eds.). 2003. A multi-species conservation strategy for species at risk in the Milk River basin: Year 1 progress report. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 72, Edmonton, AB.

Rangeland Conservation Service Ltd. 2004. Beneficial Management Practices for the Milk River Basin, Alberta: A component of the Multi-Species Conservation Strategy for Species At Risk in the Milk River Basin (MULTISAR). Unpublished report prepared for Alberta Conservation Association and Alberta Fish and Wildlife Division. Airdrie, Alberta. 369 pp.

**List of Titles in This Series**
(as of January 2005)

No. 1 Alberta species at risk program and projects 2000-2001, by Alberta Sustainable Resource Development, Fish and Wildlife Division. (2001)

No. 2 Survey of the peregrine falcon (*Falco peregrinus anatum*) in Alberta, by R. Corrigan. (2001)

No. 3 Distribution and relative abundance of the shortjaw cisco (*Coregonus zenithicus*) in Alberta, by M. Steinhilber and L. Rhude. (2001)

No. 4 Survey of the bats of central and northwestern Alberta, by M.J. Vonhof and D. Hobson. (2001)

No. 5 2000 survey of the Trumpeter Swan (*Cygnus buccinator*) in Alberta, by M.L. James and A. James. (2001)

No. 6 2000/2001 Brassy Minnow inventory at Musreau Lake and outlet, by T. Ripley. (2001)

No. 7 Colonial nesting waterbird survey in the Northwest Boreal Region – 2000, by M. Hanneman and M. Heckbert. (2001)

No. 8 Burrowing owl trend block survey and monitoring - Brooks and Hanna areas, by D. Scobie and R. Russell. (2000)

No. 9 Survey of the Lake Sturgeon (*Acipenser fulvescens*) fishery on the South Saskatchewan River, Alberta (June-September, 2000), by L.A. Winkel. (2000)

No. 10 An evaluation of grizzly bear-human conflict in the Northwest Boreal Region of Alberta (1991-2000) and potential mitigation, by T. Augustyn. (2001)

No. 11 Harlequin duck monitoring in the Northern East Slopes of Alberta: 1998-2000 preliminary results, by J. Kneteman and A. Hubbs. (2000)

No. 12 Distribution of selected small mammals in Alberta, by L. Engley and M. Norton. (2001)

No. 13 Northern leopard frog reintroduction. Raven River - Year 2 (2000), by K. Kendell. (2001)

No. 14 Cumulative effects of watershed disturbances on fish communities in the Kakwa and Simonette watersheds. The Northern Watershed Project. Study 3 Progress report, by T. Thera and A. Wildeman. (2001)

No. 15 Harlequin duck research in Kananaskis Country in 2000, by C.M. Smith. (2001)

No. 16 Proposed monitoring plan for harlequin ducks in the Bow Region of Alberta, by C.M. Smith. (2001)

No. 17 Distribution and relative abundance of small mammals of the western plains of Alberta as determined from great horned owl pellets, by D. Schowalter. (2001)

No. 18 Western blue flag (*Iris missouriensis*) in Alberta: a census of naturally occurring populations for 2000, by R. Ernst. (2000)

No. 19 Assessing chick survival of sage grouse in Canada, by C.L. Aldridge. (2000)

No. 20 Harlequin duck surveys of the Oldman River Basin in 2000, by D. Paton. (2000)

No. 21 Proposed protocols for inventories of rare plants of the Grassland Natural Region, by C. Wallis. (2001)

No. 22 Utilization of airphoto interpretation to locate prairie rattlesnake (*Crotalus viridis viridis*) hibernacula in the South Saskatchewan River valley, by J. Nicholson and S. Rose. (2001)

No. 23 2000/2001 Progress report on caribou research in west central Alberta, by T. Szkorupa. (2001)

No. 24 Census of swift fox (*Vulpes velox*) in Canada and Northern Montana: 2000-2001, by A. Moehrenschlager and C. Moehrenschlager. (2001)

No. 25 Population estimate and habitat associations of the long-billed curlew in Alberta, by E.J. Saunders. (2001)

No. 26 Aerial reconnaissance for piping plover habitat in east-central Alberta, May 2001, by D.R.C. Prescott. (2001)

No. 27 The 2001 international piping plover census in Alberta, by D.R.C. Prescott. (2001)

No. 28 Prairie rattlesnake (*Crotalus viridis viridis*) monitoring in Alberta – preliminary investigations (2000), by S.L. Rose. (2001)

No. 29 A survey of short-horned lizard (*Phrynosoma hernandesi hernandesi*) populations in Alberta, by J. James. (2001)

No. 30 Red-sided garter snake (*Thamnophis sirtalis parietalis*) education and relocation project – final report, by L. Takats. (2002)

No. 31 Alberta furbearer harvest data analysis, by K.G. Poole and G. Mowat. (2001)

No. 32 Measuring wolverine distribution and abundance in Alberta, by G. Mowat. (2001)

No. 33 Woodland caribou (*Rangifer tarandus caribou*) habitat classification in northeastern Alberta using remote sensing, by G.A. Sanchez-Azofeifa and R. Bechtel. (2001)

No. 34 Peregrine falcon surveys and monitoring in the Parkland Region of Alberta, 2001, by R. Corrigan. (2002)

No. 35 Protocol for monitoring long-toed salamander (*Ambystoma macrodactylum*) populations in Alberta, by T. Pretzlaw, M. Huynh, L. Takats and L. Wilkinson. (2002)

No. 36 Long-toed salamander (*Ambystoma macrodactylum*) monitoring study in Alberta: summary report 1998-2001, by M. Huynh, L. Takats and L. Wilkinson. (2002)

No. 37 Mountain plover habitat and population surveys in Alberta, 2001, by C. Wershler and C. Wallis. (2002)

No. 38 A census and recommendations for management for western blue flag (*Iris missouriensis*) in Alberta, by R. Ernst. (2002)

No. 39 Columbian mountain amphibian surveys, 2001, by D. Paton. (2002)

No. 40 Management and recovery strategies for the Lethbridge population of the prairie rattlesnake, by R. Ernst. (2002)

No. 41 Western (*Aechmophorus occidentalis*) and eared (*Podiceps nigricollis*) grebes of central Alberta: inventory, survey techniques and management concerns, by S. Hanus, H. Wollis and L. Wilkinson. (2002)

No. 42 Northern leopard frog reintroduction – year 3 (2001), by K. Kendell. (2002)

No. 43 Survey protocol for the northern leopard frog, by K. Kendell. (2002)

No. 44 Alberta inventory for the northern leopard frog (2000-2001), by K. Kendell. (2002)

No. 45 Fish species at risk in the Milk and St. Mary drainages, by RL&L Environmental Services Ltd. (2002)

No. 46 Survey of the loggerhead shrike in the southern aspen parkland region, 2000-2001, by H. Kiliaan and D.R.C. Prescott. (2002)

No. 47 Survey of native grassland butterflies in the Peace parkland region of northwestern Alberta – 2001, by M. Hervieux. (2002)

No. 48 Caribou range recovery in Alberta: 2001/02 pilot year, by T. Szkorupa. (2002)

No. 49 Peace parkland native grassland stewardship program 2001/02, by A. Baker. (2002)

No. 50 Carnivores and corridors in the Crowsnest Pass, by C. Chetkiewicz. (2002)

No. 51 2001 Burrowing owl trend block survey and monitoring, Brooks and Hanna areas, by D. Scobie. (2002)

No. 52 An evaluation of the ferruginous hawk population in Alberta based on recent trend data, by D.P. Stepnisky, G.L. Erickson, J. Iwaasa and B. Taylor. (2002)

No. 53 Alberta amphibian call surveys. A pilot year. Final report, by L. Takats and C. Priestley. (2002)

No. 54 Utilization of a roadside survey technique to survey burrowing owl (*Athene cunicularia hypugaea*) in southeastern Alberta, by J. Nicholson and C. Skiftun. (2002)

No. 55 Alberta species at risk program and projects 2001-2002, by Alberta Sustainable Resource Development, Fish and Wildlife Division. (2002)

No. 56 Developing a habitat-based population viability model for greater sage-grouse in southeastern Alberta, by C.L. Aldridge. (2001)

No. 57 Peregrine falcon surveys and monitoring in the Northeast Boreal Region of Alberta, 2001, by R. Corrigan. (2002)

No. 58 2002 burrowing owl trend block survey and monitoring, Brooks area, by R.F. Russell. (2002)

No. 59 Rare plant inventory of the eastern edge of the lower foothills natural subregion, west-central Alberta, by J. Doubt. (2002)

No. 60 Western (*Aechmophorus occidentalis*) and eared (*Podiceps nigricollis*) grebes of central Alberta: 2002 field summary, by S. Hanus, L. Wilkinson and H. Wollis. (2002)

No. 61 Inventory of western spiderwort (*Tradescantia occidentalis*) in Alberta: 2002, by S. Peters. (2003)

No. 62 Bullsnakes (*Pituophis catenifer sayi*) in Alberta: literature review and data compilation, by K.J. Kissner and J. Nicholson. (2003)

No. 63 Distribution of Ord's kangaroo rats in southeastern Alberta, by D.L. Gummer and S.E. Robertson. (2003)

No. 64 Lethbridge prairie rattlesnake conservation project: 2002/2003 progress report, by R.D. Ernst. (2003)

No. 65 Short-horned lizard (*Phrynosoma hernandesi hernandesi*) populations in Alberta – 2002 survey results, by J.D. James. (2003)

No. 66 Inventory and monitoring protocol for naturally occurring western blue flag (*Iris missouriensis*) in Alberta, by R.D. Ernst. (2003)

No. 67 The use of call playbacks for censusing loggerhead shrikes in southern Alberta, by D.R.C. Prescott. (2003)

No. 68 Survey of bats in northeastern Alberta, by A. Hubbs and T. Schowalter. (2003)

No. 69 Survey protocol for the Richardson's ground squirrel, by B.A. Downey. (2003)

No. 70 Population estimates and a survey protocol for ferruginous hawks in Alberta, by B.N. Taylor. (2003)

No. 71 Testing methods for detecting wolverine, by G. Mowat, C. Kyle and D. Paetkau. (2003)

No. 72 A multi-species conservation strategy for species at risk in the Milk River basin: year 1 progress report, by R.W. Quinlan, B.A. Downey, B.N. Taylor, P.F. Jones and T.B. Clayton. (2003)

No. 73 Long-toed salamander (*Ambystoma macrodactylum*) conservation in the Alberta foothills: 2002 field summary report, by L. Wilkinson and S. Hanus. (2003)

No. 74 Researching Amphibian Numbers in Alberta (RANA): 2002 provincial summary, by L. Wilkinson and S. Hanus. (2003)

No. 75 Distribution and habitat associations of the long-toed salamander (*Ambystoma macrodactylum*) in the Oldman River drainage, by K. Pearson. (2003)

No. 76 Prairie rattlesnake (*Crotalus viridis*) hibernacula: monitoring history in Alberta 1987-2002, by K.J. Kissner and J. Nicholson. (2003)

No. 77 Alberta species at risk program and projects 2002-2003, by Alberta Sustainable Resource Development, Fish and Wildlife Division. (2003)

No. 78 Northern leopard frog reintroduction: Year 4 (2002), by K. Kendell. (2003)

No. 79 Magrath Northern Leopard Frog Reintroduction Project - Year 1 Progress Report, by K.A. Romanchuck. (2003)

No. 80 Conservation Overview of Butterflies in the Southern Headwaters at Risk Project (SHARP) Area, by N. Kondla. (2004)

No. 81 Lethbridge Rattlesnake Conservation Project: 2003 Progress Report, by R. Ernst. (2004)

No. 82 Shortjaw Cisco Species at Risk Assessment 2001, by M. Steinhilber. (2004)

No. 83 Researching Amphibian Numbers in Alberta (RANA): 2003 provincial summary, by L. Wilkinson and K. Kempin. (2004)

No. 84 Methods for Controlling Depredation on Piping Plovers in Alberta: A Literature Review and Synthesis, by R. Schmelzeisen, D.R.C. Prescott and L. Engley. (2004)

No. 85 Western Blue Flag Conservation Program: 3-Year Summary Report, by K.A. Romanchuk, R.D. Ernst, and R.W Quinlan (2004)

No. 86 MULTISAR: The Milk River Basin Habitat Suitability Models for Selected Wildlife Management Species, by B. A. Downey, B. L. Downey, R. W. Quinlan, O. Castelli, V. Remesz and P. F. Jones (eds.). (2004)

No. 87 MULTISAR: The Milk River Basin, A Multi-Species Conservation Strategy For Species at Risk: Year 2-Progress Report, by R.W. Quinlan, B. A. Downey, B. L. Downey, and P. F. Jones. (2004)

No. 88 Survey of Colonial Nesting Birds and Lakeshore Habitats in Northeast Alberta, by C. Found and A. Hubbs. (2004)

No. 89 The southern headwaters at risk project: A multi-species conservation strategy for the headwaters of the Oldman River. Volume 1: Introduction and natural processes, by F. Blouin. (2004)

No. 90 The southern headwaters at risk project: A multi-species conservation strategy for the headwaters of the Oldman River. Volume 2: Species Selection and Habitat Suitability Models, by F. Blouin, B.N.Taylor, and R.W.Quinlan (eds). (2004)

No. 91 Distribution, abundance and habitat selection of northern pygmy and barred owls along the eastern slopes of the Alberta Rocky Mountains, by M. D. Piorecky and D. R. C. Prescott. (2004)

No. 92 Survey of Aquatic Gastropods in the Central Parkland Subregion of Alberta, by D. R. C. Prescott, and M. M. Curteanu. (2004)

No. 93 The 2003 Loggerhead Shrike Survey in Alberta, by D. R. C. Prescott. (2004)

No. 94 Western (*Aechmophorus occidentalis*) and Eared (*Podiceps nigricollis*) Grebes of Central and Parkland Alberta: 2004 Field Summary, by G. Berg, L. Wilkinson, H. Wollis, and D. Prescott. (2004)

No. 95 Researching Amphibian Numbers in Alberta (RANA): 2004 provincial summary, by L. Wilkinson and G. Berg. (2004)

No. 96 Gillett's checkerspot in the southern headwaters at risk (SHARP) project area, by N.G. Kondla. (2005)

No. 97 Southern headwaters at risk project (SHARP) amphibian and western painted turtle (Chrysemys picta) surveys, 2003-2004, by K.J. Pearson. (2005)